Contractors and Engineers Monthly

Vol. 38, No. 5 | MAY, 1941 | $2 a Year, 20 Cents a Copy

Highlights Of This Issue

- **Driers for Dam Core Material**

  Among the unusual features of the construction of Mud Mountain Dam near Enumclaw, Wash., which will be one of the world's highest earth and rock-fill dams, are the drying of the impervious core material and the erection of a huge tent over the dam to protect operations from bad weather. See page 2.

- **Town Widens Road**

  A description of the widening of a town road to state standards, as well as of the organization and equipment for maintaining its road mileage by the Town of Amherst, Mass., appears in this issue. See page 2.

- **Better Runway Bases**

  In preparing the subgrade for airport runways, the same basic principles of soils surveys, careful selection of material, compaction and subsurface drainage which apply to highway work should be followed in order to secure a satisfactory and stable base for paved runways and taxiways. See page 7.

- **Pan American Highway**

  The first of a series of articles on the Pan American Highway is devoted to a brief history of the project and a summary of its progress to date. Future articles will contain more details on the problems of construction of this highway. See page 10.

- **Bridge Raised on Grading Job**

  Included in a 3-mile contract for the relocation of a Vermont highway was the raising of a 70-foot steel I-beam bridge 22 feet and the construction of new 34-foot approach spans. Long cuts and fills and the installation of drainage pipe were also features of the work. See page 17.

- **Highway District Garage**

  Typical of Kentucky's twenty district garages for the maintenance of its 9,370 miles of state highways is the garage at Carrollton, a detailed description of which is included in this issue. See page 25.

IN THIS ISSUE

Initial Soil-Cement Base For Highway in Delaware

THE WORLD'S HIGHEST DOUBLE-DECK BRIDGE

Bureau of Reclamation Photo

Walking along the lower deck of the Pit River Bridge in California, "nippers" are carrying hot rivets in metal baskets to keep the riveting crew supplied for the erection of span No. 3. This deck, 35 feet wide, will carry two tracks of the relocated Southern Pacific Railroad across an arm of Shasta Reservoir, while the upper deck will carry a 44-foot roadway for U. S. 99 and two sidewalks. The American Bridge Co., contractor for the superstructure, started steel work at the south end of the bridge while the Union Paving Co., contractor for the substructure, was still working on the piers at the other end.

George & Lynch Completed 2,100 Feet Per Day, Using Agricultural Equipment, a Power Grader and Roller

(*Photos on page 56*)

✦ WHEN you hear talk of quack-grass, spike and spring-tooth harrows and soil pulverizers, you usually look around for the farmer in the crowd, but today it may mean a soils engineer is discussing soil-cement base construction in which a considerable variety of the heavier agricultural cultivating units is used. (See Editorial, C. & E.M., October, 1937, page 4, "Highway Tools Complete a Cycle.")

On a project running parallel to U. S. 13 just west of Dover, Del., George & Lynch, contractor from Delaware's capital city, completed a soil-cement base project last summer, running 2,100 feet of finished base in one day.

Preparation of Grade

After completing the installation of required drainage structures and ditches, grading the road to the new alignment, and making the necessary minor fills and cuts, the contractor hauled in 6 to 7 inches of sandy gravel from a local pit, dumped it and spread the material with a No. 12 Auto Patrol to the specified thickness and a width of 18 feet widened slightly at the curves. The specifications called for a maximum 3-inch stone in this base material but considerable hand picking was necessary on the road as larger stones were discovered during the mixing operations. This base material became somewhat compacted by hauling over the road and by traffic which used the road before the cement stabilization began, so just before the cement was laid down on the road the new base material was scarified to a depth of 6 inches, using the scarifier on the power grader. On most jobs of this character a disk is required to pulverize clogs and clay soil, but the sandy character of this soil made it unnecessary to do any disking.

Spreading and Mixing Cement

A careful analysis of the soil of the original road, as well as of the material spread on the surface, showed that 10 per cent of cement by volume would be required for the stabilization of 6 inches of soil. This meant that four bags of cement were needed every 4.44 feet. The bags of cement were spotted uniformly across the road by a crew of about fourteen men working from five trucks. They started out early in the morning and by 8 a.m. had completed preparation on the section to be worked during the day. Then a spike harrow was pulled through

(*Continued on page 12*)

High Rock-Fill Dam Rising in Washington

Mud Mountain Dam Has Dried Impervious Core; Feature of Job Is Huge Tent to Protect Work

By HENRY W. YOUNG

(Photo on page 56)

✦ MUD MOUNTAIN Dam, located on the White River 7 miles southeast of Enumclaw, Wash., is a purely flood-control project, designed to protect the Puyallup Valley and the Tacoma industrial area against floods greater than any recorded in the past. To be one of the world's highest rock- and earth-fill dams, it is designed to control a flood flow of 40,000 cubic feet per second at the dam site, which would be 50 per cent greater than the 1933 flood.

The contract for the work was awarded to the Guy F. Atkinson Co., San Francisco, Calif., and work was started in September, 1939. On November 15, 1940, the entire project was 46 per cent completed and running very close to schedule. The tunnels were 100 per cent completed and 98 per cent of the excavation had been done by that time. Approximately 900 men were working on the project, the peak having been 1,550, which will not be exceeded. Completion is anticipated early in 1942.

The dam site is formed by a narrow box canyon with nearly vertical rock cliffs about 230 feet in height. The canyon is 90 feet wide at the river bed and 150 feet wide at the top of the rock walls. Above that, the glacial-till banks slope steeply back to a width of about 700 feet at the crest of the dam, which will be about 400 feet above river level.

The reservoir behind the dam will normally be kept empty in order to receive and temporarily detain flood water discharge in excess of the capacity of the river channel, to be gradually released upon subsidence of flood conditions until it is empty again. The river will continue to run in the old channel except where bypassed around the dam through tunnels.

Normal flow and flood water will be discharged from the reservoir through two tunnels. The small tunnel, approximately 9 feet in diameter, is so designed that it will pass the normal flow of the river and, though provided with a radial gate, will usually be kept open. Excessive flood waters will be discharged through the second tunnel, which is 23 feet in diameter. The water released through this tunnel will be controlled by three 8-foot diameter horizontal sliding sleeve valves, of record size. During the construction period, the 23-foot tunnel is being used to divert the river around the dam site which is unwatered by means of cofferdams and pumps. These tunnels are on the right bank, looking down stream, and are approximately 2,000 feet long.

To prevent any possibility of water ever flowing over the crest of the dam itself, a concrete spillway with a discharge capacity of nearly five times the greatest flood recorded is being constructed on the right bank, looking down stream. This spillway will be 315 feet wide at its crest.

The main dimensions and physical data of the dam are as follows:

Drainage area	402 sq. mi.
Elev. of top of dam above sea level	1,250 ft.
Elev. of spillway crest	1,215 ft.
Lowest elev., bedrock	825 ft.
Length of reservoir	5.5 mi.
Storage capacity of reservoir	130,000 acre-ft.
Maximum flood on record	28,000 cfs.
Spillway capacity	139,000 cfs.
Outlet capacity	16,000 cfs.
Height above bedrock	425 ft.
Length of crest, excluding spillway	700 ft.
Width at base	1,600 ft.
Width at crest	50 ft.
Volume of fill, approx.	2,000,000 cu. yd.
Concrete in project	60,000 cu. yd.

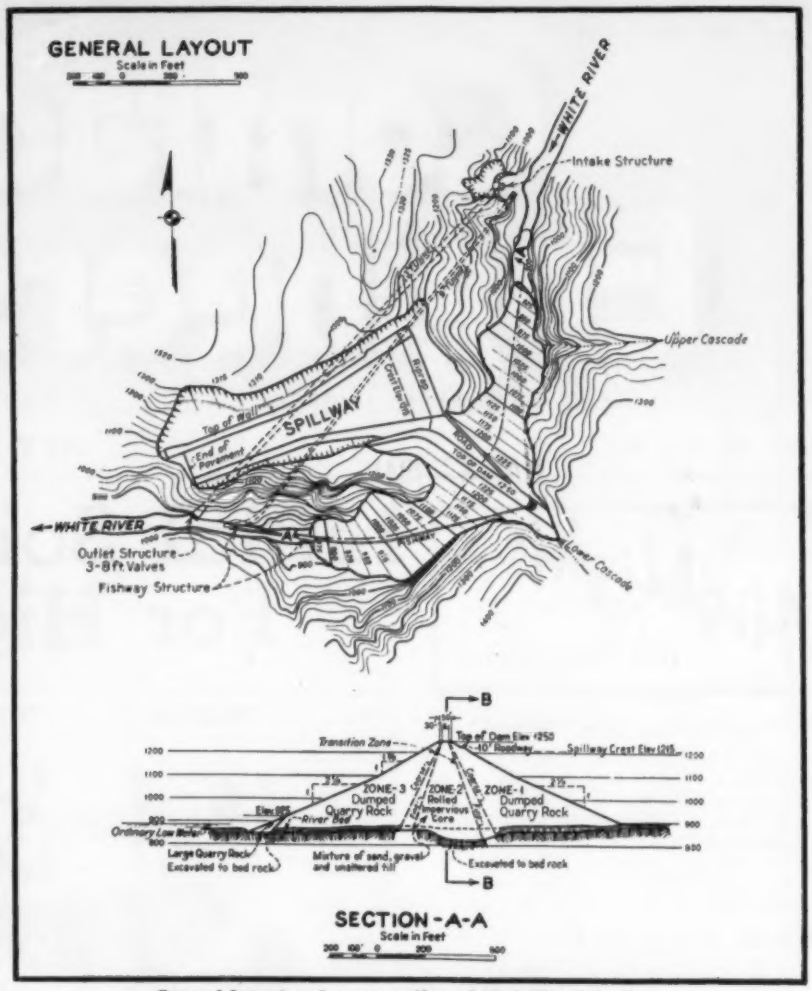
Tunnels and River Diversion

Before actual work on the dam embankment could begin, it was necessary to excavate the 23-foot diversion tunnel, divert the river through it, and excavate material from the river bed. Included in the equipment for river-bed excavation were a Northwest 80-D diesel shovel and two Northwest 1½-yard gas shovels, all rented, loading to a fleet of hired trucks including six Western 12-yard diesel trucks, eight 12-yard Internationals, six 12-yard Macks, and ten 8-yard Internationals. Excavation for the 9-foot tunnel and the spillway was carried on concurrently and they were lined with concrete. Twelve Gardner-Denver AF-89 drifters and Columbia and Hercules blasting powder were used in driving the tunnels.

After the 23-foot tunnel has served its diversion purpose, it will be plugged half way and three 8-foot 6-inch penstocks inserted, provided with the sliding sleeve valves mentioned before, for control purposes. This tunnel is also provided at the upper end with a massive concrete intake structure which will contain the trash racks.

The 9-foot tunnel which will later carry the normal flow of the stream, was concrete lined for 1,800 feet, using collapsible steel forms. The invert part of this lining was treated in a different manner, however, by laying heavy steel rails side by side, with concrete between. This was done because heavy boulders rolling through would wear out any ordinary concrete bottom. This method was used once before by U.S. engineers on the Lowell Creek project in Alaska. The remainder of the tunnel, from portal

(Continued on page 28)



General layout and cross section of Mud Mountain Dam.

Town Widens a Road To State Standards

Town of Amherst, Mass., Has Renovated Car Barn Used For Garage, Good Roads and Well-Financed Department

✦ THE curious anomaly of a state route, generally recognized by those who use it regularly as a state highway, being really a town road, plowed in winter by the State, one half the cost of which is charged to the Town, and sanded by the Town, exists on State Route 9 in the Town of Amherst, Mass. An article on the method of widening this same road by state maintenance forces in the adjacent town of Belchertown appeared in CONTRACTORS AND ENGINEERS MONTHLY, January, 1936, on page 24.

The work of widening by Amherst town forces was done in such a substantial and thorough manner that we wish to record the details here for other towns, counties and states to follow when narrow bituminous or other roads must be widened with an assuredly strong foundation under the widening strip.

Widening an 18-Foot Road

Route 9 from Amherst to Belchertown was an 18-foot road with an old 12-inch stone base, laid many years ago, of material from local stone walls. This was topped with 2 inches of trap rock and asphalt penetration. This route is carrying an increasing amount of traffic from eastern Massachusetts to Amherst and Northampton in the western section of the state. The Town of Amherst deemed it wise to widen it 3 feet on each side to handle this volume of traffic more satisfactorily. All of the trench for widening was dug with a hired Bay City ½-yard shovel. The foundation for the 3-foot widening strips is 18 inches deep, put in as 12 inches of new gravel rolled to firmness with a Lawrence steel cylinder slipped over the dual pneumatic tires at the rear of a truck and on this was spread 3½ inches of crusher-run trap rock bound with sand and rolled to firmness. On top of this, 2½ inches of 1¼-inch stone was spread and rolled with a heavy 3-wheel roller as this was at the same elevation as the surface of the old road at the edges.

This surface course of stone was penetrated with 2 gallons of OA3 hot Beacon asphalt applied by Mace Moulton and then covered immediately with hand-cast ½-inch crushed stone and rolled with a

(Continued on page 18)

Panorama of Mud Mountain Dam on the White River 7 miles southeast of Enumclaw, Wash., showing the camp, spillway and canyon wall excavations.

C. & E. M. Photo

S. P. Puffer, Superintendent of Streets and Sewers, Town of Amherst, Mass.

Construct the Airport's Runways with ASPHALT

for these important reasons

Fairchild Aerial Surveys

The runway system, parking space and part of the hangar apron at La Guardia Field, New York City, were paved with Asphalt Penetration Macadam; approximately 3,000,000 gallons of Texaco Asphalt were used.

There is a type of Texaco Asphalt runway for every airport.

HEAVY-DUTY TYPES

(a) Texaco Sheet Asphalt
(b) Texaco Asphaltic Concrete (hot or cold laid)
(c) Texaco Asphalt Macadam (penetration type)

INTERMEDIATE TYPES

(d) Plant-mix type, using Texaco Cutback Asphalt or Slow-curing Oil
(e) Traveling plant-mix type, using Cutback or Slow-curing Oil
(f) Mixed-in-place type, using Cutback or Slow-curing Oil

Have a Texaco field engineer recommend the runway type called for by your airport. Your request for his cooperation entails no obligation whatever.

1. Asphalt runways are resilient. Their ability to absorb heavy impact increases their life span and reduces maintenance cost.

2. Asphalt provides a variety of types of runway construction, one of which will satisfy most economically the particular needs of each airport.

3. Asphalt runway surfaces readily maintain contact with the subgrade, an important factor when airports are constructed over fill.

4. Asphalt runways are highly skid-resistant in wet weather, as well as in dry.

5. Asphalt runways are unaffected by seasonal variations in temperature.

TEXACO ASPHALT

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THE TEXAS COMPANY, Asphalt Sales Dept., 135 E. 42nd St., New York City

Chicago Philadelphia Houston Boston Richmond Jacksonville

Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

Member of Controlled Circulation Audit

Issued Monthly by Buttenheim-Dix Publishing Corp.
Editorial and Business Office: 470 Fourth Ave., New York City

Printed in Mount Morris, Ill., U. S. A.

THEODORE REED KENDALL, Editor

EDGAR J. BUTTENHEIM.....President
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Credit Where Credit Is Due

Perhaps one of the factors in the very vital question of the contract vs. WPA or other governmental agency method of carrying on defense construction is the fact that the general public is so little informed about the skill and efficiency which contractors bring to a job. For the most part, the public is aware that a structure has been built or a job completed, but it has little or no idea of who was the contractor responsible for its completion. The contractor gets none of the glory, but if by any chance something goes wrong, he usually gets all the blame.

In line with this lack of recognition of the efforts of contractors, there recently appeared an interesting letter to the Editor in the *New York Times* and we feel that it should be quoted. The letter says:

"Reports describing dedication ceremonies at the completion of national defense projects are appearing in the papers. This is fine and good news to the public. But I have yet to see any recognition given to the contractor.

"A little while ago the huge ordnance plant constructed at Radford, Va., for the Hercules Powder Co. and the Federal Government by the Mason & Hanger Co. of New York was dedicated. This $44,000,000 plant was completed in about six months, ninety days ahead of schedule—an amazing performance. During the dedication ceremony there was not a single word of commendation for the contractors, nor for their capable responsible men who worked day and night to achieve this astonishing result.

"The contractors doing defense work have been selected from among the leading organizations of the nation; selected for their ability, experience and their record of past performance. It requires peculiar skill, long experience and almost perfect cooperation and coordination to do millions of dollars' worth of emergency construction work in a few months. Management ability of a high order is required.

"The picture is not so rosy for the contractors as the uninformed think. The very best of their organization and plant are devoted to their defense work; their civil work almost always suffers.

"I am sure that it would be heartening to defense work contractors if more officials would give some public recognition of their vital contribution to the defense of the nation."

This letter is signed by H. O. Locher of Jackson Heights, N. Y. We say "Hear, hear!" to this expression of his opinion which is shared by all who wish to see the construction industry play the part which it wishes and is so well equipped to play in the National Defense Program.

DRAINAGE AND SODDING PREVENT THE EROSION OF TEXAS ROADSIDES

See Page 22.

A New Scholarship For Pan-American Division of A.R.B.A.

The Pan-American Division of the American Road Builders' Association has announced that an additional scholarship has been underwritten by CONTRACTORS AND ENGINEERS MONTHLY, for the benefit of a Latin-American engineer.

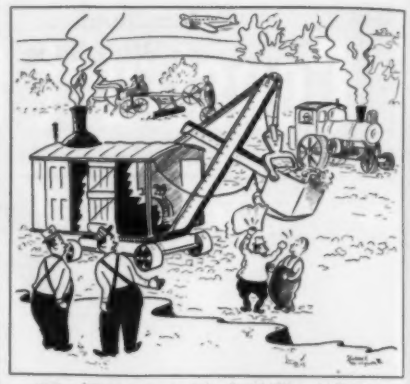
These scholarships of the A.R.B.A. Pan-American Division are granted each year to young Latin-American engineers in order to foster better understanding of the methods and equipment used in the solution of highway problems in this country and of how they may be applied to the same type of problems in the neighboring countries to the south.

Students must have at least 2 years of experience in the line of study in which they wish to specialize, they must be 21 years of age and a citizen of any of the North, Central and South American or Caribbean countries or islands, they must have a civil engineering degree from a recognized school or university or an acceptable degree in subjects pertaining to the design, construction or operation of highways, sufficient knowledge of the language, and certain other qualifications.

The Pan-American Division Committee formulates in each case a detailed program of study for the candidates. The student makes a weekly report to the secretary of the Committee and presents a thesis at the end of the study to the Committee which grants a Pan-American diploma.

First Free Bridge Over Ohio

The first bridge across the Ohio River to be made free of tolls is the Henderson Bridge crossing the waterway at Evansville, Ind., and Henderson, Ky. The span was built in 1932 and on March 15, 1941, was made a free bridge, it is reported in *Highway Highlights*.



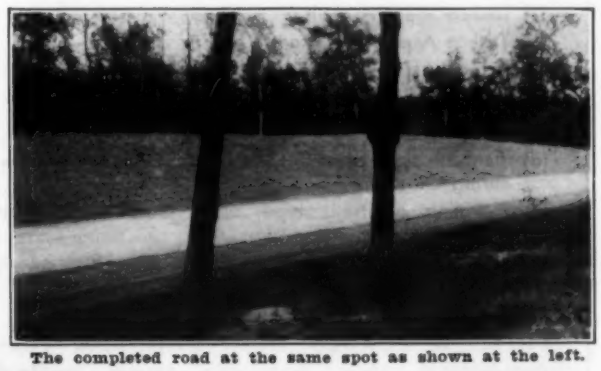
"The Boss is a bit irritable today—some foreign agent approached him to buy his equipment for scrap iron."

Block sodding was placed above the vertical walls of all the grouted-riprap stepped drains, as shown here at Sta. 166+71 Rt., on the Oran Speer 3.6-mile grading and drainage contract near Woodville, Texas.

The block sod cutter used on the Oran Speer contract in Texas.

Placing block sod in a drainage ditch at Sta. 94 Lt. on U.S. 190.

Grading under way at Sta. 157 to 161 on U.S. 190 in Texas.



The completed road at the same spot as shown at the left.

Trench sodded embankment at Sta. 169 Lt.

A view of the completed project at Sta. 99, facing west, on U.S. 190.

Catalogs on Streamlined Clamps for Wire Rope

The Safe-Line wire rope clamp, made by the National Production Co., Safe-Line Clamp Div., 4571 St. Jean Ave., Detroit, Mich., is designed to eliminate entirely the possibility of cutting or scratching your hands on the sharp severed strands of a wire rope while handling a loop or sling, as all these exposed sharp ends are enclosed inside of the clamp itself. These clamps are made entirely of high-tensile-strength alloy-steel forgings and may be assembled and installed by unskilled workmen. No special tools are required.

Further information may be obtained by writing direct to the manufacturer and asking for forms No. 250M and 500M.

Molded Brake Lining And Friction Blocks

Palmer asbestos-metallic molded friction blocks are made from Canadian asbestos fibres, mixed with a special binding compound and reinforced with fine brass wire uniformly distributed throughout the material. This metallic construction, according to the Palmer Asbestos & Rubber Corp., 180 N. Michigan Ave., Chicago, Ill., increases the mechanical strength and prolongs the wear. They can be used on all types of commercial and industrial equipment, ranging from a block weighing 0.032 ounces for use on a washing machine to a huge friction ring weighing 410 pounds for installation on a dredge.

These friction blocks, as well as Palmer molded brake lining, hydraulic folded and compressed brake lining, and woven brake lining, are described in literature recently issued by this company. Copies may be obtained by writing direct to the manufacturer.

New Catalog on 50th Anniversary Model Pumps

Commemorating its 50th Anniversary, the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., has recently published a new catalog on the 1941 models of Rex Speed Prime pumps. Besides including illustrations, detailed information and specifications concerning the design and manufacture of these pumps, it also contains data on how to pick a pump for a specific job.

Copies of this catalog, No. 384, may be obtained direct from the manufacturer.

A Cletrac and a Heil 12-yard Model RS-3 hydraulic scraper.

Hydraulic Scraper Takes 12-Yard Load

With a cutting width of 8 feet 8 inches and a simple hydraulic operating system which opens and closes the front gate, raises and lowers the scraper bowl and operates the rear push-out apron, the new Heil Model RS-3 12-yard hydraulic scraper is said to pick up and dump capacity loads in fast time.

Three control levers are mounted on the back of the tractor seat, handy to the operator, giving him convenient finger-tip control. Each lever connects to the scraper control valve by means of a flexible armored cable, and the operator merely moves these levers forward and back to raise or lower the hoist pistons for scraper operation.

The scraper shown in the illustration is powered by a tractor which has a dual hook-up for operating either the Model RS-3 hydraulic scraper or a Model HT-95 Heil trailbuilder from the same hydraulic pump. Further information on this new scraper may be secured direct from the Heil Co., Milwaukee, Wis., by referring to this item.

Five New Tractors Of Industrial Type

Five new wheel tractors, designated as the I line and including three models with carburetor-type engines and two with International easy-starting full-diesel engines, have just been announced by the International Harvester Co., Inc., 180 No. Michigan Ave., Chicago, Ill.

Designed for a variety of construction, maintenance, materials-handling and transportation work for contractors, and state, county and township highway departments, all five of these new tractors have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 14 or 15 miles an hour, gear drive, countershaft brakes which can be individually controlled or interlocked, provision for mounting a variety of equipment, and various other features.

The three gasoline-engine-powered tractors are designated as Models I-4, I-6 and I-9. The engine of the I-4 has a bore and stroke of 3⅜ x 4¼ inches and develops 29.5 hp at a rated governed speed of 1,650 rpm; that of the I-6 has a 3⅞-inch bore x 5¼-inch stroke and develops 40.5 hp at 1,450 rpm; and that of the I-9, a 4.4 x 5.5-inch bore and stroke and develops 54 hp at 1,500 rpm. The two new diesel-powered tractors, the ID-6 and ID-9, are similar in dimensions and other characteristics to the I-6 and I-9, differing only in the engines. The diesel engine of the ID-6 has a 3⅞ x 5¼-inch bore and stroke and develops 38.5 hp at the rated governed speed of 1,450 rpm, and that of the ID-9, a bore and stroke of 4.4 x 5.5 inches and develops 51.5 hp at a rated governed speed of 1,500 rpm.

Among the equipment which can be used with these five new International wheel tractors are maintainers and graders, front-end shovels and loaders, snow plows, road rollers, cranes and hoists, winches, brooms and sweepers, mowers, disk harrows and mixers for mixed-in-place roads, scrapers, dump wagons, trailers and tampers.

Road-Joint Material And Subgrade Paper

A standard line of expansion joints as well as specialty types for unusual services are included in the products of the Keystone Asphalt Products Co., 43 East Ohio St., Chicago, Ill., a newly formed division of the American-Marietta Co. of Chicago. This new company manufactures a complete line of asphalt, fibre, and cork expansion joints, as well as other paving specialties including sewer compounds, subgrade felts, asphalt planking, waterproof board, and other items for the highway industry. T. R. Johnson, who for the past 10 years has specialized in the expansion joint field, has just been appointed Sales Manager.

Keystone standard asphalt joints are composed of asphalt, fibre and mineral fillers, formed into sheets having a layer of felt on both sides for reinforcing. They are furnished in any cut sizes or in slab form up to 36 inches wide, and in standard lengths of 5 or 10 feet. The Keystone fibre expansion joint is made of a non-extruding resilient product which permits free action of the concrete slab and consists of a fibre board specially treated and impregnated with a waterproof asphalt. Under compression tests, this joint shows no extrusion and a high degree of recovery. It has a board-like consistency, aiding in handling during installation.

The Keystone cork expansion joint is made from new cork particles with a resinous binder, and is produced under heat and pressure for curing to the proper consistency, thereby retaining all of the inherent features of the natural cork. The manufacturer reports that the resiliency of these joints permits recovery up to 95 per cent or greater after compression. New automatic machinery is used for cutting, punching and notching all Keystone expansion joints, in order to eliminate delays on the job.

Full details and prices on these expansion joints may be secured by interested contractors and engineers direct from the manufacturer.

Subgrade Preparation For Airport Runways

Basic Principles for Highway Work Apply to Airports; Soils Survey Important to Both

By EDWARD A. WILLIS, Associate Highway Engineer, Public Roads Administration

✦ THE modern Class 4 airport has an area of paved runways and taxiways equivalent to some 50 to 75 miles of highway 20 feet wide but, instead of extending from point A 50 or 75 miles to point B as a highway does, the airport is usually confined to an area having a radius of approximately one mile. This concentration of activities materially simplifies the application of those principles of subgrade preparation and base construction which are widely used in the highway field and which may be pertinent to airports as well.

The first step in an orderly attack on subgrade problems in either highway or airport-runway construction is the soils and materials survey to provide the engineer with an inventory of the materials of construction which are available locally, and to define the natural conditions under which these soils occur. Thus the soils survey, which includes the location and mapping of all strata and deposits, complemented by laboratory tests to identify and determine the physical properties of the materials encountered, may largely influence the design of both subgrade and base course and may be a determining factor in the selection of the pavement type.

The specific purposes of a soils investigation for both highways and airports are as follows: 1. To determine the suitability of foundation soils and to estimate their settlement characteristics; 2. To determine the necessity for subsurface drainage and to establish the proper location for such drains; 3. To identify soil and ground water conditions productive of frost heave and to furnish information necessary in designing against its occurrence; 4. To classify the soils encountered with regard to their suitability for use in various parts of the structure so that effective disposition can be made of the materials during grading operations; 5. To provide data useful in controlling the compaction of earthwork; 6. To determine the need for blanket courses, to estimate the required thickness and to provide information on the location and suitability of backfill material; 7. To facilitate the selection of local materials for use in base-course construction; 8. To establish the proper proportions of materials incorporated in the base course; 9. To provide data necessary for adequate control during base construction.

Survey Party Starts Out

After the site for the project has been selected, the soils survey party starts its work. By means of a series of borings with a 1½-inch soil auger or a 4 or 6-inch post-hole auger, the surveyor locates the extent, both horizontally and vertically, of the several strata and deposits of soils existing within the area. This information should be recorded on the field data sheet.

Preliminary borings made by an experienced soils engineer will identify the soils which are encountered. Thereafter the work may be expedited by employing laborers to make the borings at designated spots in an orderly manner, saving the soil removed for identification as to depth. In this manner the soils engineer can supervise the work of a considerable number of laborers and keep adequate records, particularly in airport work since activities are concen-

(Continued on page 40)

A prospective airport site in a low-lying swampy area. In such locations foundation settlement is probable unless provisions are made to prevent it. Deep borings to determine the depth of unstable material must be made and undisturbed samples are desirable unless the muck can be economically excavated. Fill will be made from borrow so the engineer may readily select the best available material for use under runways and taxiways.

New Publications Issued By The Asphalt Institute

Publications recently issued by The Asphalt Institute in both its Research and Construction Series include the following: Research Series No. 6, "The Significance of Various Methods of Test Used on Asphaltic Paving Materials"; Research Series No. 7, "A Direct Method of Determining Thickness of Asphalt Pavement with Reference to Subgrade Support"; Construction Series No. 54, "The Washington National Airport and Choice of Surfacing Types for Airports"; Construction Series No. 55, "Specifications for Asphalt Enamel Protective Coatings for Steel Water Pipe"; Construction Series No. 56, "Asphalt for Heavy-Duty Highways"; and a new edition of the "Pocket Reference Manual for Highway Engineers" which includes the most recently developed data on asphalt uses.

Single copies of these publications are available to officials, engineers, and contractors without charge, upon request either to this magazine or The Asphalt Institute, 801 Second Ave., New York City.

Air-Control Excavator

The Osgood Co., Marion, Ohio, announced recently the issuance of a new, fully illustrated catalog describing its Type 80 Model 800 air-control shovels, draglines and cranes. The book sets forth in its 16 pages how the Model 800 is built, how air-control works, and shows the importance of air-control in modern excavating machinery. The illustrations show working parts of the machines in addition to action shots depicting the Model 800 at work on various jobs.

Copies of this catalog, No. 4102, may be obtained from the manufacturer.

Pneumatic-Tired Barrows

The American Steel Scraper Co., Sidney, Ohio, announces its 1941 streamlined tubular wheelbarrows for contractors in Bulletin No. 28. These wheelbarrows are available in three models, No. 1, 2 and 3, with a struck capacity of 3, 2½ and 2 cubic feet, respectively. The trays are of seamless steel and are level in the wheeling position; the handles are of tubular steel with rubber handle grips; the load is carried on the wheel; and its short wheelbase assures easy turning, according to the manufacturer.

Bulletin No. 29A issued by this company is devoted to its DeLuxe concrete barrows, extra large concrete barrows, standard, and the No. 1 stone barrow. All of these wheelbarrows may be equipped with American Safety-ized pneumatic tires which reduces the possibility of punctures, slow leaks, creeping, etc.

Copies of these catalogs may be obtained direct from the manufacturer.

Personnel Changes at G-E

C. I. MacGuffie has been appointed Manager of Sales, Electric Welding Section of the General Electric Co., Schenectady, N. Y., to succeed L. D. Meeker, now associated with the Smith-Meeker Engineering Co., New York City.

New Dealer for Ransome

The Ransome Concrete Machinery Co., Dunellen, N.J., has announced the appointment of Kern-Limmerick, Inc., 115 No. Spring St., Little Rock, Ark., as its new representative in that territory. This company will handle the sale of Ransome mixers, 56-S and larger, pavers, truck mixers and agitators, bituminous mixers, hoist buckets, and other equipment in the Ransome line.

The Pan American Highway; A Summary of Its Progress

Brief History of Project; Reports Show Much Has Been Done; Major Problem Now One of Financing

By MAJOR B. P. ROOT,
Highway Specialist, Public Utilities Unit, Div. of Industrial Economy, Bureau of Foreign and Domestic Commerce

✦ THE first official recognition of the need for improved highway communications in Latin America was expressed at the Fifth International Conference of the Pan American States, held in Santiago, Chile, in 1923, when a resolution was passed calling for a highway conference. The Argentine Government invited the member countries to meet at Buenos Aires, and accordingly the First Pan American Congress of Highways was held there in October, 1925. Representatives of nineteen countries, including a delegation from the United States, attended, and so strong was the feeling that cooperation was essential that it was decided to make the Congress of Highways a permanent institution.

U. S. Takes Action

Following the Sixth International Conference of American States in Havana in 1928, which recommended to the Pan American Congress of Highways "the consideration and adoption of agreements looking to the construction of a road of longitudinal communication across the continent, taking up and deciding all questions relative to studies, route, branch connections, technical and economic cooperation of the different countries, and all other matters involved in the solution of such a problem," the United States Congress adopted a joint resolution "that the Government of the United States should manifest the purposes of the aforesaid resolution; and that in order to promote the speedy realization of these purposes and objects the President is requested to direct the several agencies of the Government, and they are hereby authorized, to lend such cooperation and assistance as may be feasible and appropriate with a view to having the matter thoroughly considered by the approaching Conference".

On December 15, 1928, another joint resolution was introduced in Congress, and was later approved by the President. This authorized the appropriation of the sum of $50,000 to enable the Secretary of State to cooperate with the several Governments, members of the Pan American Union, in reconnaissance surveys to determine the best route of the proposed Inter-American Highway, *when they should initiate a request or signify a desire to have this cooperation.*

Further Action Taken

The Second Pan American Congress on Highways, meeting at Rio de Janeiro in August, 1929, expressed great interest in the development of highways in the New World, concluded that such highway development was vital to the interests and welfare of the peoples of the various countries, and recommended among other things that the President of the United States appoint qualified engineers from the Bureau of Public Roads to act as members of the Inter-American Highway Commission and to proceed with the development of the economic, financial and other factual data necessary to the consideration of the construction and maintenance of a highway from Texas to Panama.

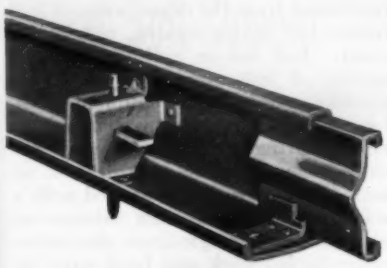
Accepting the invitation of the Government of Panama, delegations from the United States and five Central American countries returning from the Congress at Rio attended a special conference at Panama in October, 1929, to consider and if possible to provide for the early completion of the portion of the projected Pan American Highway extending from the southern border of the United States to the Panama Canal. The Mexican Government, which had not accepted the invitation to this conference, had indicated that it had already located most and constructed parts of the Highway through Mexico and would continue work thereon.

This Conference resolved to recommend the appointment by the Pan American Union of an Inter-American Highway Commission, the interested governments to nominate their respective members, and also to recommend to the governments of the Republics of Panama, Costa Rica, Nicaragua, Honduras, Salvador, Mexico and the United States (Guatemala having already accepted an invitation to cooperate) that they cooperate with the Commission and facilitate its work, furnishing all possible facilities on the works carried out in their respective territories in the accomplishment of its mission, and also that the Pan American Union recommend to its members the construction of a road suitable for vehicular transit through each country within five years.

Appropriation for Survey

The appropriation of $50,000 for

(*Continued on page* 42)



The new Jaeger road form.

New Heavy-Gage Form For Highway Work

Increased rigidity and greater accuracy of alignment are two of the features claimed for the new Jaeger DeLuxe road forms recently announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio. Made of special carbon steel plate 7/32 inch thick, instead of the usual 3/16 inch, and with improved-design triple-braced stake pockets riveted at five points to the base, face and top of the form, these new heavy-duty road forms are built to hold true to line and grade and resist distortion under modern heavy-duty high-speed spreading and finishing equipment. Although huskier and stronger throughout, it is stated that a 9 x 8-inch section weighs but 21 pounds more than 3/16-inch forms.

Other features of the Jaeger heavy-duty road forms include the joint plate completely telescoped with both top rail and base guide to insure accurate alignment, maximum rigidity of lock, and provide support for the outside edge of the top rail. The lock plate extends 3 inches from the face of the form for easier hammering when locking or unlocking, a feature which is said to eliminate 90 per cent of the usual breakage. Chamfered ends facilitate setting on curves. Jaeger Duo-Rails for centering a load when needed fit these new forms.

Further information on Jaeger road forms may be secured by interested contractors and engineers direct from the manufacturer.

Bituminous Mixer Booklet

The Barber-Greene Co., Aurora, Ill., has recently published an attractive booklet, illustrated in natural color photography, which presents the three basic set-ups of its bituminous mixer; the travel plant, for low cost road-mix; the central plant, for intermediate-type mixes; and the central plant with gradation control for high-type mixes. The correct applications of each set-up are thoroughly discussed.

Copies of this booklet, known as Bulletin 842, may be obtained by those interested direct from the manufacturer by mentioning this item.

New District Engineer For Asphalt Institute

Announcement has been made of the appointment of George H. Dent as District Engineer for The Asphalt Institute, with offices in the Transportation Building, Washington, D. C. Mr. Dent served with the Maryland State Roads Commission from 1924 to 1940 as Materials Engineer and then as Soils and Bituminous Engineer, and more recently as Paving Engineer for the Civil Aeronautics Administration for the thirteen states comprising the North Atlantic Division, with headquarters at La Guardia Field, New York.

A new Mack tractor with Easton semi-trailer.

New Tractor Trailer For Quarry Operation

For quarry operations which require negotiating steep grades, a new high-powered Model LFT Mack tractor combined with a sturdy Easton semi-trailer has been announced by Mack Trucks, Inc., Long Island City, N. Y.

The tractor has a 140-inch wheelbase and is powered by a 6-cylinder 4¼ x 5⅜-inch bore-and-stroke engine, and is designed particularly for this type of work. The semi-trailer unit of the combination has a side-dump body of 13-cubic yard capacity and is made by the Easton Car & Construction Co., Easton, Penna.

Mixing and Testing For Soil-Cement Base

(Continued from page 1)

to spread the cement fairly uniformly across the 18 feet of road. A 2-bottom 14-inch plow, working to a depth of 6 inches, was used along the edges of the roadway to form a definite hip to prevent the cement mixture from spreading across the shoulders. This kept the full percentage of cement within the 18-foot width.

Dry mixing was then continued with a heavy-duty quack-grass cultivator pulled by an RD4 tractor, and a Farmall F20 pneumatic-tired tractor pulling a spring-tooth harrow and a spike harrow, the latter acting more as a leveler behind the first harrow. The major portion of the mixing was performed by a Seaman motorized Pulvi-Mixer driven by a Waukesha motor and pulled by a Farmall F20 tractor. The Pulvi-Mixer worked a swath 6 feet wide each time it went over the road, and the heavy spring teeth, rotating at approximately 1,700 rpm, not only aided in pulverizing the soil mixture and thoroughly stirred up the soil and cement, mixing it completely, but also brought oversize stones quickly to the surface so they could be removed by hand.

During the dry mixing, test holes were dug by the inspector to determine the thoroughness of the mix. Dry mixing on a 2,100-foot length of road was usually completed in from 3 to 4 hours by the equipment described above.

Wet Mixing and Testing

At the end of dry mixing, a moisture test was made by the Soils Engineer, and the amount of water required to give the optimum moisture for the soil with the cement carefully computed. On this job it amounted to 10.3 per cent by volume. Following this, the water up to two-thirds of the computed volume required was applied from a 1,000-gallon tank mounted on a Ford truck and equipped with a Jaeger 3-inch pump for delivering the water under pressure through 18-foot perforated spray bars. When the theoretical two-thirds point was reached, tests were made at several places to determine the amount of water lost by evaporation. During this application the mixing operation was continuous with the same equipment as used for dry mixing. Mixing was continued for the entire period during which the water was applied, varying from 1½ to 3 hours, according to the quantity of the water used, which in turn depended somewhat on evaporation losses.

C. & E. M. Photo

A flash photo of the Pulvi-Mixer shows the machine in action and the oversize stones brought to the surface during mixing on U.S. 13 west of Dover, Delaware.

Rolling and Curing

At the end of mixing, the material was bladed from the edges, where it had worked out during mixing, toward the center. Just before rolling began, a number of tests were made for final moisture to be sure that optimum conditions existed for the hydration of the cement during the compaction of the homogeneous mixture of soil and cement. Rolling was then started with a LeTourneau double-drum sheepsfoot roller and two single-drum sheepsfoot rollers pulled back and forth over the road, compacting the material from the bottom up, and was continued until the feet actually walked up out of the material. Following this a spike-tooth harrow was run over the surface to remove the last of the sheepsfoot holes and then the surface was shaped with the power grader. Another scarifying of the surface with the spike-tooth harrow provided a surface mulch of about 1 inch for easy working for the final shaping.

As the shaping approached completion a multiple drag broom was pulled over the surface and it was ironed out

(Concluded on next page)

Initial Soil-Cement Project in Delaware

(Continued from preceding page)

with a 10-ton Buffalo-Springfield tandem roller followed by rolling with truck tires to knead and seal in the stones firmly. On some of the work during particularly dry weather a small increment of water was applied to the surface after the sheepsfoot rolling to take care of evaporation from the fines remaining on the surface.

The finished shaped and rolled base was then protected with from 1 to 2 inches of loose hay or 2 inches of loose dirt and kept moist for 10 days. Following this, the power grader removed the protecting material and the base was ready for a light bituminous surface treatment to complete the road.

Personnel

The contract for grading, drainage, structures and soil-cement base for this highway was awarded to George & Lynch of Dover, Del., for whom Joe Pennington was Superintendent. The work was done under the direction of the Delaware State Highway Department, W. W. Mack, Chief Engineer, with Theodore Pyle as Resident Engineer, and M. P. Harrington as Soils Engineer. During most of the work, Rockwell Smith, Soil-Cement Field Engineer of the Portland Cement Association, assisted the engineers of the Delaware State Highway Department on this initial project.

C. & E. M. Photo
Water for wet mixing on Delaware's first soil-cement project was delivered from a 1,000-gallon tank truck, with allowance made for evaporation.

New Rubber Joint Used For Concrete Runways

At the new Toledo Airport being completed this spring, a new rubber compound of the hot-poured type which is said to seal expansion and contraction joints during all movements of the slabs is being used in the more than 165,000 square yards of concrete runways at the airport. More than 33,000 pounds of the quick-hardening compound, known as Rai-Seal, is required for the job.

Specifications for the airport runways called for a joint sealer which would have three essential characteristics: adhesion to concrete surfaces, resiliency at low temperatures while being expanded, and non-flowing properties at continued summer temperatures while under compressures. The new compound has been tested in actual use for four years on heavily traveled highway routes and it is reported that not only were the joints still sealed at the end of that period but that indications were that the material's efficiency would extend over a longer period.

The chief use of Rai-Seal, which is manufactured by Rubber Associates, Inc., 1230 Sixth Ave., New York City, is in pavement construction and maintenance, in airport runways, and in bridges, hangars, reservoirs, and similar structures where it is important to prevent the infiltration of water and foreign materials between slabs with consequent breakage.

Rai-Seal is recommended as a top seal for a depth of 1 to 1½ inches over a pre-formed filler strip of the non-extruding type. The method of installing it is essentially the same as that for bituminous materials. The compound is melted at 400 to 450 degrees F. in a regular heating kettle, poured into the joint, and may be exposed to traffic in from 10 to 20 minutes. It is made in concrete color to blend with new concrete pavements and structures, and in black for resealing.

Promotions at LeTourneau

R. G. LeTourneau, Inc., Peoria, Ill., announced recently the appointment of Walter L. Schump as Assistant Advertising Manager, succeeding A. Robert Thomson who has been promoted to the Sales Department Training Division.

Other changes in the advertising department promote Paul R. Miller to national copy with Eugene E. Weyeneth taking over his News Bureau activities.

Cold-Mix Resurfacing Of Concrete Pavement

A 2.2-Mile Retread Job Completed Quickly With a Fleet of Trucks Hauling 10 Miles in W. Va.

✦ AN old 16-foot concrete pavement, which had broken badly and had been widened 2 feet on each side with bituminous strips, on U. S. 21 northeast of Vienna, W. Va., was resurfaced for 2.2 miles last summer by A. B. Osborn & Co. of Clarksburg, W. Va. In places where the old subgrade had failed, causing complete disintegration of the pavement, the state maintenance forces had removed the concrete and laid a new stone base.

Long Hauls

The contractor used a fleet of ten dual-pneumatic trucks hauling 4-ton loads of hot-mix cold-laid bituminous material an average of 10 miles from the plant of the West Virginia Black Rock Co. on the southside of Parkersburg, W. Va., to the job.

Fast Spreading

The plant-mix material was laid in two courses, a 1-inch binder course of 90 pounds per square yard spread 1½ to 1¼ inches loose and comprised of ¼ to 1-inch stone with 3.5 per cent of asphalt, covered with 60 pounds per square yard of plant mix with a maximum ½-inch stone and 5.5 per cent asphalt. The two courses were spread 10 feet wide with a Jaeger bituminous paver into which the trucks dumped their loads at the proper rate to keep the hopper of the spreader filled and with their clutches disengaged so that the entire truck load of bituminous material and the paver itself were all moved by the traction of the paver on the old road. This was difficult on grades and in some other places where it was hard to secure sufficient traction to keep the machine lined up.

The operating crew on the road consisted of one man releasing the tailgates of the trucks and breaking out the load so that it would flow uniformly into the hopper, one operator for the Jaeger bituminous paver, one man adjusting the screeds to maintain the binder as a leveling course, and one spotter behind the machine to straighten up the edges where poor traction on the road had slightly swung the machine so that the outer screed placed material beyond the guide cord stretched along the pavement.

This outfit was able to run about 1 mile of binder in a 10-hour working day, despite some delays in trucks making the 10-mile haul over a winding road and becoming entangled with one-way traffic at the end of the job.

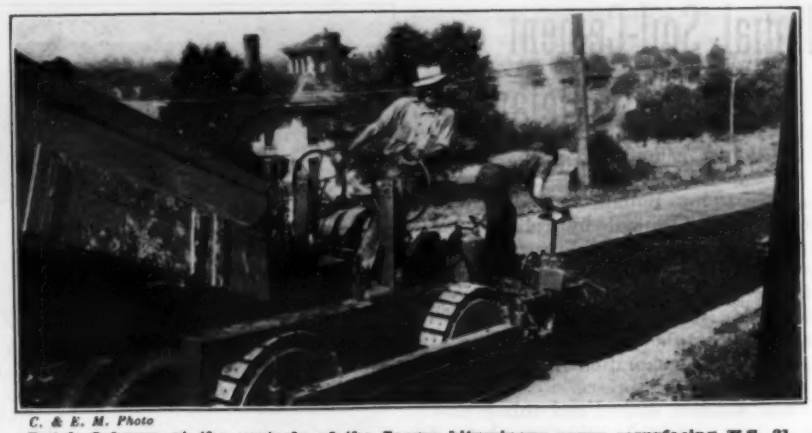
Traffic Maintained

On any paving job work is severely complicated by the need for maintaining traffic through the work at all times. On this contract when the first strip was being spread traffic was held at the end of the job and sent through with a flag one way at a time. This same process had to be repeated when paving the second side, with traffic using the binder course laid initially.

Both the binder and surface courses were thoroughly bonded to the pavement, compacted and bonded together by careful rolling with a Buffalo-Springfield 10-ton 3-wheel gasoline-engine-powered roller.

Personnel

The work on this contract, State Road Commission of West Virginia Project 2077, Wood County, was done under the supervision of J. M. McKinney, of Parkersburg, W. Va., who furnished the paver used on the job. "Dutch" Osbourn was Foreman on the job and operated the Jaeger bituminous paver. "Dutch," who was one of the most active men on the job, was a member of Major Whittlesey's famous Lost Battalion whose heroic stand in the Argonne played an important part in the World War.



C. & E. M. Photo
Dutch Osbourn at the controls of the Jaeger bituminous paver resurfacing U.S. 21 in West Virginia.

The largest single item of maintenance of the San Francisco-Oakland Bay bridge is paint, on which $108,290 was spent in 1940. Approximately 15,000,000 square feet of steel space has to be maintained, which will be painted in about five-year cycles.

Line of Diesel Engines And Generating Sets

Features of Murphy diesel engines, made by the Murphy Diesel Co., Milwaukee, Wis., and ranging in power from 83 to 200 hp, include unit injectors, through steel tie bolts, hydraulic servo type governor, open combustion chamber, safety control, oil-cooled pistons, lubricating oil cooler, and electric starting directly on the diesel cycle.

This company has recently issued a series of bulletins describing and illustrating its diesel engines in detail, giving specifications and showing their various applications. Copies may be obtained by writing direct to the manufacturer.

This company will also be glad to send literature on its complete diesel electric generating sets in capacities ranging from 55 kw to 115 kw per unit, the features of which are compactness, ease of operation, efficiency and portability.

Luminous Road Signs

Although America has not yet reached the "black-out" stage and it is to be hoped that we never shall, the necessity of precaution against revealing to an enemy the location of airports, major highways and structures as well as military establishments has resulted in the development of luminous cat-eye traffic and direction signs and road markers. The feature of luminous Reflecto-Chain, which is distantly visible in an approaching focused light, is that it is also visible at short distances in total darkness, because of its luminosity.

Reflectorized signs have been so improved recently that they will pick up and reflect exceedingly dim lights, such as would be used by cars under blackout precautions, but only recently has it been made possible also, by a special process widely used in England, to make these signs and markers luminous in the dark. Provisions have also been made for making these reflected lights invisible from overhead, except where and if required for landings at airports.

Reflecto-Chain, made by the Star-Lite Co., Indianapolis, Ind., consists of a flexible chain in which are mounted the reflectors and which can be fastened to any type of signs to form letters, numbers or symbols as required. Further information on these traffic markers may be secured direct from the manufacturer by mentioning this item.

Steel Wheelbarrows

The first pressed steel tray wheelbarrows ever made in this or any other country were manufactured by the Jackson Mfg. Co., Harrisburg, Penna., in 1876, it is reported. Other equipment in its line includes lawn rollers, concrete carts, drag scrapers, salamanders, mortar pans and mortar mixing boxes.

Catalog No. 40, issued by this company, contains descriptive data on this equipment. Those interested may obtain copies by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

A Monroe portable canvas house.

New Portable Houses For Construction Jobs

With the greatly increased amount of construction occasioned by the national defense program, there arises the problem of housing the men working on the job.

One solution of this problem is offered by The Monroe Co., 50 Bridge St., Colfax, Iowa, in its line of portable canvas houses of all sizes from small 6 x 8-foot individual units to 18 x 36-foot bunk houses for whole crews.

Designed originally for touring and camping, these portable houses have recently been redesigned and engineered for commercial use. It is stated that they are in use in all parts of the world, serving contractors, oil and pipe line companies, field surveying parties and many others.

This Monroe house is entirely portable, the walls and top being of canvas. Since it is unlined, it is not designed for winter use in cold climates, but it is stated that these factors make the house most comfortable in other seasons. The upper half of the wall is a canvas shutter operating in metal channels, the shutters being raised and lowered from the inside.

The house is easily and quickly erected with a few tools by inexperienced labor, and can be taken down and used over and over again. The anchorage is from the roof, not the base, guy wires being attached to rails running through the eaves of the canvas roof. Hence the pull is downward on the whole frame and the tension is the same on every part of the roof. It is stated that many years of severe tests have indicated that these houses will stand up against high winds.

Further information on these Monroe canvas houses, which are suitable for field offices as well as for construction camps, is contained in a 20-page booklet which illustrates the various models in use all over the world and lists some of the users of these houses. Copies of this booklet may be secured by interested contractors and engineers direct from the manufacturer.

New Dirt-Mover Models

Supplementing the Model C Tournapull announced last summer, R. G. Le Tourneau, Inc., Peoria, Ill., has announced two new Tournapull models of the same general design and performance but with more powerful engines and larger-capacity Carryalls.

Powered by either a 130 or 150-hp 6-cylinder diesel engine, the Super C utilizes this extra power to increase production per hour by pulling a Model LP Carryall with a struck capacity of 12.1 and a heaped capacity of 15 cubic yards, thus increasing production as much as 35 per cent compared with the smaller Model C.

Standard equipment on the Super C Tournapulls includes hydraulic brakes on both the Tournapull and the Carryall, front crankcase guard with pull hook, front bumper, electric lights, starter, horn and cab. Tire selection has been made to provide maximum flotation and speed for the varied operating conditions encountered. The Tournapull is equipped with two 21.00 x 24 pneumatic tires and the scraper with two 18.00 x 24 tires.

Hercules Steel Makes Stevens Cement Boxes

The exclusive patent rights to manufacture and sell the Stevens Turn-O-Matic cement boxes, Stevens Batch Barrels and Wheel Batchers for handling bulk cement, have been acquired by Hercules Steel Products Co., Galion, Ohio. Shipments of 11 and 15-cubic foot boxes will be made within two weeks after receipt of order.

Further details regarding these systems of handling bulk cement will be found in literature which may be secured direct from Hercules Steel Products Co. by mentioning this item.

New Bulletins Describe Air-Controlled Shovels

The Michigan Power Shovel Co., Benton Harbor, Mich., has recently issued four new catalogs on its line of air-controlled excavators. Bulletin 240 describes its Model C-16 ½-yard power shovel which, according to the manufacturer, combines high-speed operation and heavy-duty construction with balanced weight distribution. Bulletin 11-40 is devoted to the mobile Michigan tandem-drive shovel-crane which is available in three models, TMCT-16, TLCT-16 and THDT-20. Its ⅜-yard truck shovel is fully described and illustrated in Bulletin 204 and the Model TF6 truck-mounted shovel equipped with four-wheel drive in Bulletin 140. All of these excavators are quickly convertible from crane to shovel, trench hoe or dragline.

Copies of the catalog covering the piece of equipment in which you are particularly interested may be obtained by writing direct to the manufacturer.

Bridge Span Raised On Vt. Grading Job

Lane Constr. Corp. Builds Relocation of Road Around Wrightstown Dam and Also Stretches an Old Bridge

✦ MANY passersby stopped in amazement when they saw the 70-foot steel I-beam span of Shady Rill Bridge north of Montpelier, Vt., in mid air on cribbing and missing the abutments by some 34 feet at each end. Inquiries or closer inspection showed that the original bridge was being raised and new 34-foot approach spans were being built between the new open abutments and the enlarged old abutments while the bridge was being raised 22 feet to clear high water. This was but a part of the 3-mile grading, drainage and 15-inch gravel base job on the Montpelier-Worcester-Morrisville Road, completed in the summer of 1940 by the Lane Construction Corp. of Meriden, Conn.

The work was made necessary by the backing up of flood waters by the Wrightsville Dam of the Winooski River Flood Control Project in order to give an all-year access road to the village of Shady Rill and other communities to the north of the capital city of Vermont. Heavy grading of long fills was common and 2,800 feet of standard 6-inch perforated corrugated galvanized asphalt-coated metal pipe and some reinforced-concrete culvert pipe was installed. Lane handled the trimming of slopes in an economical manner. On side-hill cuts made with the scraper the earth slopes were hand-trimmed immediately following the excavation so that the entire earth cut was taken out by the scraper as part of the regular excavation.

Five LeTourneau 12-yard Carryall scrapers pulled by Caterpillar RD8 tractors handled the earth while an Ingersoll-Rand wagon drill and I-R 315-foot compressor, a Gardner-Denver wagon drill and 320-cubic foot compressor, and two 110-cubic foot Gardner-Denver compressors and I-R Jackhamers did the drilling in rock, with holes mostly 20 feet deep and a maximum of 25 feet. These were shot with 40 and 60 per cent Atlas dynamite. All rock was loaded by a single Bucyrus-Erie 37B 1½-yard diesel shovel to Linn tractors owned by the contractor.

Successive Cuts and Fills

The work started off at the north end with a side-hill ledge cut, then ran into a 1,200-foot fill composed of 21,000 cubic yards of earth and 5,000 yards of rock of which 12,000 yards was borrow. LeTourneau Carryall scrapers were used on all of the earth borrow. This fill averages 7 feet in height with a maximum of 12 feet.

At the south end of the long fill there is a 900-foot through cut and side-hill cut in clay and ledge. The road then runs through Putnamville where there was no change in grade or line to amount to anything. On the south side of Putnamville is a 4,000-yard rock cut 400 feet long, then a 2,700-foot section of 32,000 yards of material from excavation and 42,000 cubic yards of borrow. This takes the road from the north right up to the bridge over Shady Rill which is a feeder to the north branch of the Winooski River above the Wrightsville Flood Control Dam.

The section south of the bridge had one long side-hill cut 12,500 yards in 3,750 feet in which the excavation was 90 per cent earth but the remainder was boulders. This was all handled with the scrapers including 7,200 cubic yards of borrow. At the extreme south end known as Section A, 3,350 feet long, there was a bad frost boil condition requiring 400 cubic yards of excavation to remove 18 inches of material and then the section was backfilled with 700 cubic yards subbase of gravel. Opposite the Wrightsville Dam, 2,200 cubic yards of borrow was used to eliminate a reverse vertical curve as well as to lengthen sight distances for safety.

The contractor went right through the job and did practically all of the rock work first so as to release the shovel to another job and save the rental charge made by the company against

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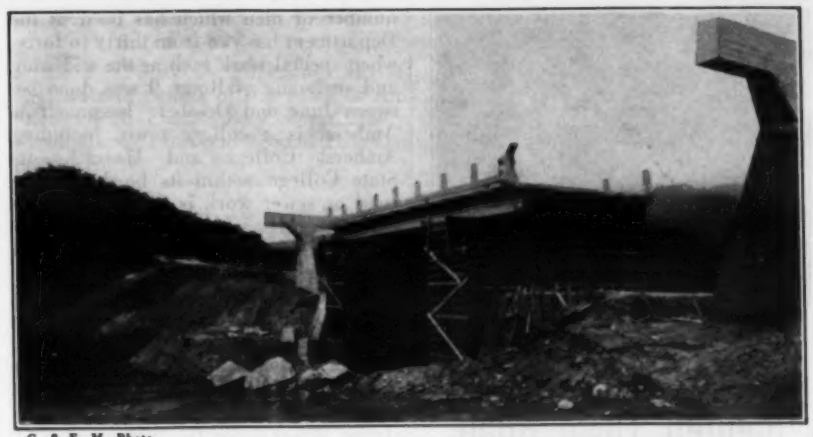
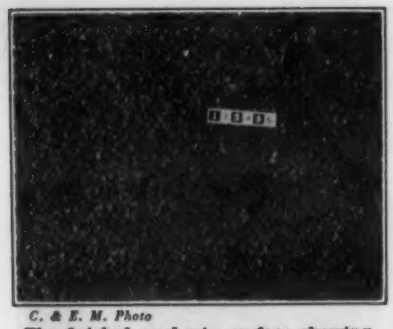


C. & E. M. Photo

High and dry on cribbing, this steel span over Shady Rill north of Montpelier, Vt., was raised 22 feet and new abutments built with 34-foot approach spans.



C. & E. M. Photo
The finished road-mix surface showing ½-inch stone keyed to the old surface on a town road in Amherst, Mass.

Widening Town Road To State Standards

(Continued from page 2)

10-ton roller. On all curves this widening was extended to 6 feet on the outside and the standard 3 feet on the inside. The surface was sealed with ½-gallon of the same asphalt, chipped and rolled.

Resurfacing Route 9

The widening strips did nothing to improve the surface characteristics of the old road which was rather smooth and liable to produce skidding in wet weather. Therefore an application of 1/3-gallon of T9 tar, a quick-setting product of the American Tar Co., was shot 10 feet wide on one side of the road and immediately covered with ½-inch stone chips while traffic went through on the other side of the road on a flag. This surface was laid in the morning and traffic was permitted over it in the afternoon, or if the surface was laid in the afternoon it was open to traffic the same evening. The second half of the road was treated similarly.

The Town Highway Department

The Highway Department of the Town of Amherst, Mass., is created by the Board of Selectmen. There are three Selectmen, one elected each year for a 3-year term, and this Board appoints the Superintendent of Streets for the Town. The present incumbent, S. P. Puffer, has been on the job for eleven years of consecutive appointments. Working under Mr. Puffer are two foremen and a regular crew of thirteen men which is expanded as necessary by from eight to ten temporary laborers. The maximum number of men which has been in the Department has run from thirty to forty, when special work such as the widening and surfacing of Route 9 was done between June and October. Inasmuch as Amherst is a college town, including Amherst College and Massachusetts State College within its borders, little road or sewer work is done during the college year.

Highway funds are secured from a real estate tax, as all state gas tax money returned by the Commonwealth of Massachusetts goes directly to the Town Treasury and must be appropriated for specific purposes by a vote of the town meeting. In 1940, the money appropriated for the Highway Department included $25,000 for the maintenance of roads, $4,600 for the maintenance of equipment and $3,000 for the Chapter 90 work done by the Town in conjunction with the county and state.

The Superintendent of Streets keeps the time of all the men and equipment as he makes his daily frequent rounds of all operations in his Department, but on Chapter 90 work a regular timekeeper is employed. The two foremen are brothers and each also runs a road roller.

Town Equipment

The equipment owned and operated by the Town in caring for the 80 miles of Town roads and the Town sewerage system includes three 1½-ton International trucks and one 2-ton International truck, all with Goodyear or Fisk balloon tires on the rear wheels and cord tires in the front. Balloon tires are used on the rear wheels because it is easier to get out of soft gravel pits, and although they may not wear as long as cord tires the Superintendent feels that they make up for this many times over by the savings in wear and tear on rear axles. The only additional automotive equipment is one Dodge 1937 coupe for the use of the Superintendent.

For removing snow from the 80 miles of Town roads there is one Baker V-plow and three Good Roads blade plows. In addition a Sargent V-plow is mounted on a Caterpillar Thirty-Five gasoline tractor which carries an Athey bulldozer during other seasons of the year. In addition the Town owns two Baker and two Good Roads pusher plows which are mounted on hired trucks as required.

For construction equipment there are two Rex tilter mixers and one old mixer. The newer Rex tilter is used for concrete work and the two other mixers for cold patch. There is one Buffalo-Springfield 3-wheel 12-ton roller with a scarifier, and two Adams drawn graders with 8 and 10-foot blades which are used for the maintenance of gravel roads and for dressing shoulders.

The Snow and Ice Program

It is the plan in Amherst to start snow plowing when about 3 inches of snow is on the road and then to continue until the snow has stopped. The Town owns four sidewalk plows which are pulled by farmers' horses.

Inasmuch as there is adequate storage space at the town barn, about 500 yards

(Concluded on next page)

Amherst Town Roads Are Well Maintained

(Continued from preceding page)

of sand is placed in the barn in the fall. When it comes time to place this on the road because of icy conditions, a Haiss 20-inch belt loader is used to load the sand onto trucks under cover. As the sand is being loaded, one bag each of sodium chloride and calcium chloride are thrown over the sand in the truck for each 2 yards of sand loaded. This is the schedule for bad ice storms and one-half this amount is used for usual storms. Note that the chlorides are thrown onto the sand in the truck and not onto the loader, because of their corrosive properties.

The Town Barn or Garage

The Town of Amherst is very fortunate in having acquired an old car barn for the Town Garage. This was built at a cost of some $23,000 by a now defunct electric railway and was purchased by the Town for $5,000. The storage space previously used for street cars is now used for storage of sand, and the steam pipes running behind it preclude the sand being frozen and in fact keep it very dry during the winter. In this space also is stored snow fence, the V-plows, a small Galion spreader and two of the Vermont-type Superior spreaders which are also used to apply chips in tar surfacing, and the concrete mixers.

The regular Highway Department crew makes up a considerable quantity of reinforced-concrete guard rail posts in the storage shed during the winter. When these have been used up in the summer, the crew cast six in steel forms each morning before they go out on the road and remove them from the forms the next morning, cleaning and oiling the forms before making another pour of six posts.

In the office section of the building the Superintendent of Streets has his office while the night watchman lives at the garage so that there is always somebody on duty. On the first floor there is a toilet and lavatory and in the shops, located back of the offices, is a complete blacksmith shop which is used in winter for painting equipment, and for the storage of the Lawrence roller, and here also are located a complete Alemite and Zerk lubricating system and the coal fire boiler for steam heating the entire building in winter.

On the second floor of the office section is a recreation room for the men where motion pictures of highway work are shown and of some of the vacation trips which the Superintendent has taken. Here also is storage for tires and small equipment which are kept under lock and key.

Regular Road Work

In 1940 the Town built about 1 mile of road in accordance with its standard methods of construction for Town roads. First, about 10 inches of gravel was placed on the road, shaped and rolled, and then on top of this 3 inches of 1¼-inch stone which was penetrated with 1¾ gallons of hot OA3 Beacon asphalt and then ½-gallon per square yard for seal covered with hand cast ½-inch stone. This road was laid 20 feet wide through a farming country where there is much horse traffic and many cleated tractors using the road. It was completed at a cost of $5,700 for all of the work from the new gravel through to the seal.

For patching operations ¼ and ½-inch stone, mixed in one of the tilting mixers with tar or cut-back asphalt, is used very successfully on practically all Town roads.

Personnel

S. P. Puffer is Superintendent of Streets and Sewers of the Town of Amherst, with Frank and George Fluery, brothers, as First and Second Foremen, respectively.

Rock Crusher on Tour

A new streamlined gyratory crusher powered by a gasoline engine, both made by the Allis-Chalmers Mfg. Co., Milwaukee, Wis., and mounted on a big orange and green streamlined truck, is making a novel demonstration tour over the country.

This traveling unit, with its Speed-Set product-size adjustment, will stop at many a crushing plant in order to give contractors, state, county and township engineers, and sand and gravel plant operators an opportunity to see for themselves how this all-steel crusher can be made to work efficiently on their own products.

Further information on the features of this new crusher, known as the Model R gyratory crusher, may be secured direct from the manufacturer by referring to this item.

This streamlined demonstration crusher unit, consisting of an Allis-Chalmers Model R gyratory crusher and an A-C gasoline power unit mounted on a truck, is now making a tour of the country.

Proper Crane Care Cuts Delay Costs

Breakdowns Are Costly; Usually Can Be Avoided By Regular Inspection And Maintenance

By F. L. SPANGLER, M. E.

✦ WHEN a crane has to be shut down unexpectedly to make a repair, it is almost always due to improper inspection and maintenance. Enforced idleness of cranes is expensive, for it usually results in idle crews, whose pay goes on just the same as if they were working, it halts operations, and gums up work schedules. Such delays mean additional overtime, and hence further expense.

In addition to reducing the final total cost of a job, proper crane maintenance also promotes safe working conditions, saving life and limb and reducing the likelihood of damage caused by failure of some part. Those who have had the experience of "dropping" a crane boom or a roped counterweight know how such an accident can put a crane out of commission for a long period, and result in costly repairs.

All parts of a crane should receive frequent inspection by a qualified person. No rule can be laid down as to how often such inspection should be made, but on large cranes handling heavy loads on important contract work, inspection should be made every day, and an inspection at every shift is not too frequent under some conditions.

Engine or Motor Inspection

The power plant of the crane should receive especially careful attention. The engine, whether internal-combustion or steam, must be kept in perfect working order. In this connection, the crane operator himself can be of assistance in noting any unusual operating condition and reporting it immediately.

Where the crane is electrically operated, such parts as motor commutators, bearings, wiring and control equipment need attention. Maintenance of magnetic contactors is generally confined to the filing or dressing of the copper contacts. Many magnetic switches are now being made with silver alloy contacts, which eliminate virtually all contact attention, since the oxides formed by the heat of the arc on silver are good electrical conductors. Therefore, heavy currents do not produce local heating, which is generally the cause of fusing of contacts.

At the regular time for making electrical inspections, limit and safety switches should be tested. Inspection should also be given the runway and bridge wiring. The conductors should be cleaned of any foreign material that may have collected on them, and the bridge conductors should be examined to see that they are taut.

In the course of the general electrical inspection, all minor repairs and replacements should be made wherever it is convenient to do so. Arrangements should be made to take care at some later time of adjustments and repairs that are not made at time of inspection. Where the crane has to be shut down to effect temporary or permanent repairs, this is usually because regular inspections have not been properly made.

Rope Very Important

Among the equipment which should receive regular inspection are ropes, sheaves, and drums. One of the valuable characteristics of a wire rope is its "reserve strength". Inspection for breaks in the crown, or outer, wires, or for reduced diameter of the rope, reveals the condition of the rope, from which it is possible to determine whether it should be condemned. When properly installed and used, a wire rope has seldom been known to fail completely. Before parting in two, it almost always gives unmistakable warning by the breaking of a strand or two, or by a quite sudden elongation which indicates deterioration of the hemp center.

Most ropes are not subjected to uniform conditions of service along their entire length, and hence they show deterioration first in one or two places. In the case of a closing rope on a clamshell bucket, the short section that operates over the closing sheaves receives most severe damage, and most of the abuse of the tag line occurs in that section of rope between the bucket and the guide sheave on the boom. These sections of rope particularly should be carefully inspected. Other likely places to examine for wire breaks is near small sheaves, at the drums, and at sockets, clips and other fastenings.

Wire breaks in ropes operating over drums and sheaves are generally caused by metallic fatigue. To reduce the frequency of replacement or rope adjustment, many cranes are equipped with preformed rope, one of the characteristics of which is its resistance to fatigue. Often it is found that those responsible for re-roping a crane prefer preformed rope because it is easy to handle and does not tend to loop and kink, thereby saving, so one master mechanic claims, half the time required to re-rope with other types.

There are many places where used rope can be applied without serious results should the rope break. However, where rope failure would endanger life, destroy property, or put the crane out of commission for some time, better judgment would dictate the use of only new rope, to be followed by careful inspection at frequent and regular intervals. This applies to boom lines and to some extent to hoist and counterweight lines. The unexpected dropping of a boom may endanger life and cause damage to any equipment that happens to be in the way. Also considerable time is lost in re-roping the boom and making any necessary repairs before the crane can again be put into service.

When a line on a large bridge crane parted and dropped a 15-ton counter-

(*Concluded on page* 51)

New Calendar Is Almanac For Concrete Contractors

A new large-size wall calendar which serves as an "almanac" for contractors handling concrete form work has just been issued by the Richmond Screw Anchor Co., 838 Liberty Ave., Brooklyn, N. Y. Arranged on the large single sheet which carries the three-months-at-a-glance calendar pad is a series of charts and tables giving practical concrete-pouring suggestions, common form lumber data, handy facts about sizes, lengths, strength, etc., of wire nails, tables of decimals of a foot for each 1/8 inch up to 12 inches, tables of weights and areas of reinforcing steel, concrete information on water-cement ratios, and a chart giving complete information on Richmond Ty-Spacing, form lumber, concrete rise per hour, and similar data.

The calendar runs from the month of April for a full year and is offered for free distribution at this time when the information it contains can be put to immediate use. Copies may be secured free of charge by interested contractors and concrete engineers direct from the Richmond Screw Anchor Co. by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Chain Belt Dealer

The Johnston Equipment Corp., 1204-8 Fifth St., Sioux City, Iowa, has been appointed exclusive distributor of the Rex line of construction equipment, including concrete mixers, pavers, pumps, truck mixer and agitator bodies, and Pumpcrete units, in the Sioux City area. Wagner M. Johnston, President of the firm, has been identified with the construction equipment industry for a number of years.

Catalog Shows Walking Draglines on the Job

An attractive catalog issued by the Page Engineering Co., Clearing Post Office, Chicago, Illinois, presents a series of photographs showing Page walking draglines in use throughout the country in construction, reclamation and flood control. These walking draglines are built in capacities of 3½ cubic yards and larger and, according to the manufacturer, are high-speed units of the most modern design, incorporating the use of the newest in alloy steels.

Copies of this catalog, as well as detailed information on a machine particularly planned for your excavation problems, may be obtained by writing direct to the manufacturer and mentioning this item.

Promotions at Pioneer

Announcement has been made by the Pioneer Engineering Works, Minneapolis, Minn., of the appointment of Carl R. Rolf, formerly District Sales Manager for the central states, as Assistant Sales Manager at Minneapolis. Orval Ohnstad succeeds Mr. Rolf as District Sales Engineer covering the central states.

Sodding Problems On Texas Highway

Superintendent on Job Made Helpful Suggestions For Handling Work on 3.6-Mile Grading Job

(*Photos on page 4*)

✦ AN interesting feature of a recent 3.6-mile grading and drainage contract to relocate U. S. 190 in Tyler County, Texas, was the variety of types of sodding used on the roadsides in order to control erosion. The crown width of this new route is 34 feet, with 4 to 1 maximum embankment slopes. In cuts the inside slopes are 10 to 1 and the backslopes usually 4 to 1.

On slopes 4 to 1 or flatter, trench sodding was used on 18-inch centers, while on the steeper slopes it was placed on 24-inch centers. Mulch sod 3 inches thick was specified for all backslopes, and block sodding of a minimum 3-inch thickness was used for the side slopes of some of the channels and at the head walls of several culverts.

Drainage Structures

There were seventeen drainage structures on the job, and the plans provided for block sodding at the upstream end of four, at the downstream end of three, and at each end of only one of these structures. James Spencer, Superintendent for the contractor, Oran Speer of Alvord, Texas, advocated placing block sod both upstream and downstream adjacent to the headwall and wings of every structure, and this was done. The solid sod placed at structures has served its purpose excellently, for since May, 1940, when the project was completed, it has not been necessary to spend one cent for maintenance at the culvert ends.

Common mortar riprap stepped drains were designed for placement in infall and outfall channels having relatively steep gradients. The plans did not provide for block or any other type of sod to line the sections of the channel banks above the vertical walls of the stepped mortar riprap drains. However, it was decided that it would be advantageous to do this, to which Mr. Spencer agreed.

The grouted riprap stepped drains

An Allis-Chalmers 13-hp tractor and sod cutter preparing block sod on the Oran Speer 3.6-mile grading contract near Woodville, Texas.

were constructed essentially as proposed by the plans, except at the downstream end of the structure at Station 166+71. No provision was made on the plans for structural control of erosion at this location; however, after the culvert was completed the first rain made apparent the need of some type of riprap. The sandy soil here had eroded to the extent that the downstream toewall of the culvert was exposed. The Superintendent cooperated with the State Highway Department engineer on the job and constructed a very satisfactory grouted riprap stepped drain 16 feet in length and of a width equal to that of the end spread of the wings.

Sodding

Trench sod was placed in accordance with the plans, but Mr. Spencer was apprehensive of the proposed thickness of 3 inches for the mulch sod and suggested to the engineer that this type of sod be thicker. The engineer agreed and practically all of this type of sod was placed 4½ inches thick. Much better results were secured on the sections where the thicker sod was placed.

On the uphill side of a side-hill section from Sta. 86 to 89, the engineer was compelled to modify the backslope to a ratio of 1½ to 1 in order to stay within the right-of-way. After the section was completed it proved to be too steep for the angle of repose and there was considerable trouble with slides. The Superintendent on several occasions suggested to the engineer that if additional right-of-way or an easement could be secured at this point, he would rework this section. The easement was secured and Mr. Spencer, true to his word and with considerable difficulty, finished the backslope to a 3 to 1 slope. It was then sodded and no slipping or sliding has oc-

(*Concluded on page 34*)

New Catalog Describes Revolving Dirt Scraper

The completely new RC Groundhog revolving tractor scraper, manufactured by Farm Tools, Inc., Mansfield, Ohio, can be quickly and easily changed from full automatic loading to semi-automatic or rope control. The change is made by moving the attachment of the loading spring from one stud to another which takes but a minute. When operating as an automatic scraper, the trip chain only is used, pulled once for loading and again for spreading or dumping. The tractor automatically pulls the bowl out of bite when loaded and holds it in the hauling position. When set for rope control, the bowl does not automatically assume a loading position, but a pull on the loading rope tips it to any desired angle for fast or slow loading. The tractor takes it out of bite as the rope is released, so that it is under control at all times.

This scraper, which is available in two sizes, 3/5-yard and ¾-yard, is described in detail in a catalog, copies of which may be obtained by writing direct to the manufacturer.

Line of Friction Materials

The Gatke Corp., 224 No. La Salle St., Chicago, Ill., manufactures all types and sizes of brake linings and clutch facings, large or small, standard or special. It can equip enormous stripping shovels that scoop up 32 yards of earth at a time with giant-size linings and facings, or cranes that lift loads weighing hundreds of tons, or, at the other extreme, it can supply a clutch facing so small it fits into the hollow of your hand.

A bulletin recently issued by this company describes its line of material in detail, and illustrations show its extensive and varied use in industry. Copies of this bulletin may be obtained by those interested direct from the manufacturer by mentioning this item.

A close-up of the Rototiller.

Rotary Tilling Now Applied to Road Work

Rotary tilling is not a new idea. It has been used for 100 years or more in the agricultural field, but with the development of road mix and stabilization for low-cost highways, the tilling principle has been borrowed from the farmer and applied to the highway.

Among this type of equipment which has been adapted to road work is the Rototiller which is available in two models, a tractor unit and a power trailer model. The tractor unit consists of a wheel-type tractor powered by a 6-cylinder Chrysler industrial gasoline engine rated at 75 hp but arranged to deliver 35 hp, and the tiller which is driven by a bevel gear from a special worm and spur gear reduction on the rear axle. This combination gives eight forward speeds of ½, 1, 1½, 2, 2½, 3½, 4 and 8 miles an hour at 1,500 rpm, and four tiller speeds. The overall length of the unit is 13 feet, and it makes a cut 5 feet wide and up to 15 inches deep. The trailer unit, designed for use with either wheel or crawler tractors, is powered by the same type of engine used in the tractor model and makes the same size cuts.

The tilling unit consists of twelve two-tine disks mounted on a horizontal axle and is equipped with a hydraulic lift which permits the operator to raise or lower the entire unit into or out of the ground simply by moving one lever backward or forward. The main feature of the Rototiller is the new mounting of the tines in rubber holders. It is said that in addition to absorbing shocks and furnishing resiliency, these holders make it possible to reduce the frontal area of the mounting and permit the insertion of different shapes of tines to meet the conditions encountered.

In addition to use on road mix, stabilization and soil-cement road work, the Rototiller is also applicable to the problem of preparing the ground for roadside and boulevard seeding. Further information on this unit may be secured by interested contractors and engineers direct from Rototiller, Inc., 102nd St. & 9th Ave., Troy, N. Y., by mentioning this item.

Wire Rope and Strand

Bethlehem wire rope and strand are made in a complete range of types and sizes to meet the multitude of diverse requirements of industry. The different grades of steel, kinds of core, types of construction and special features utilized to meet various service requirements are described in a catalog, published by the Bethlehem Steel Co., Bethlehem, Penna. In addition, there is information on wire rope clips, bridge sockets, wire rope sockets, hoist hooks, thimbles, slings and Bethlehem guard rail.

Copies of this 126-page catalog, No. 154, may be obtained without charge direct from the manufacturer.

Catalogs on Expansion Joint and Subgrade Felt

The Philip Carey Co., Lockland, Cincinnati, Ohio, has available four new bulletins: Form 3027 devoted to Elastite rubber expansion joint, Form 4167C on Elastite expansion joint, Form No. 2054-A on subgrade felt, and another entitled, "Carey Elastite Products" describing Elastite asphalt tile, asphalt plank, asphalt expansion joint and rubber expansion joint. All bulletins are profusely illustrated and contain informative data on the subject covered.

Copies of the bulletin in which you are interested may be obtained by writing direct to the manufacturer and mentioning this item.

One District Garage Serves Nine Counties

Kentucky Maintains Twenty District Garages and One Central Garage at Capital; Carrollton Garage Typical

(*Photos on page* 56)

✦ TO maintain the 9,370 miles of state highways of the Commonwealth of Kentucky in proper condition, it is necessary to have a large fleet of construction and maintenance equipment distributed throughout the state. To effect this, the state is divided into nine districts, each of which includes from one to twenty counties, with one to five garages in each district, making a total of twenty district garages. A central garage at Frankfort serves as a distribution depot for repair parts which are requisitioned by the various garages, and complete records are maintained there on perpetual inventories by number, showing the disposition of each part and its cost. Stock orders are sent to Frankfort once a month, and emergency requisitions are taken directly to Frankfort and the parts brought back by one of the District pick-up trucks.

In addition to the large mileage of state highways, there is a large Rural Highway Program in Kentucky on which state highway construction and maintenance equipment is employed for the benefit of the counties. Further, when a county road has a 60-foot right-of-way, is 20 feet wide and is surfaced with a minimum gravel surface, it is turned over to the state for maintenance. Thus it becomes the ambition of every county to have as many of its roads as possible with the proper right-of-way, which is the most difficult requirement to fulfill, so as to relieve the county of the burden of maintenance.

The District Garages of the Kentucky Department of Highways are located as follows:

Garage Number	Location
1	Paducah
1A	Mayfield
1B	Princeton
2	Madisonville
2A	Bowling Green
2B	Russellville
2C	Owensboro
2D	Corydon
3	Buechel
4	Bardstown
5	Falmouth
5A	Carrollton
6A	Danville
6B	Lexington
7	Pikeville
8	Ashland
8A	Flemingsburg
9	Williamsburg
9A	Pineville
9B	Somerset

A Typical District

The District, which was inspected quite completely by the Editor during a 5-day trip in the locality, is comprised of nine counties, eight of which are along the northern border of the state touching the Ohio River, and the last, Grant County, immediately south of the main group. The counties along the Ohio River, from west to east, are Oldham, Trimble, Carroll, Gallatin, Boone, Kenton, Campbell and Pendleton, with Grant County lying south of Boone and Kenton Counties and just west of Pendleton County. To serve this District there are two District Garages, one at Carrollton in Carroll County near the west end of the District, and one at Falmouth at Pendleton County at the southeastern end of the District. The Garage at Carrollton is the subject of this article as it is typical of the garages throughout the state.

Storage Garage

The Carrollton Garage, located about ¼-mile south of U. S. 42 on U. S. 227, has three main buildings, consisting of a storage garage, a repair garage, and a shed containing the blacksmith shop and boiler room. The storage garage, a galvanized iron structure on a steel frame, is 37 x 130 feet in plan and contains eight large storage areas with heavy doors to protect the contents from the weather.

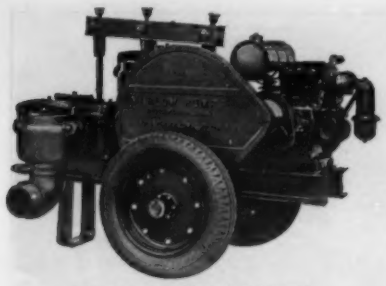
In the east end is the sign shop where plain white enamel signs with black borders and the standard square yellow signs are hand lettered with suitable wording to fit the location where they are to be placed. Here also are stocked the embossed enamel signs for both State and Federal highways and the enamel signs with inserted reflector buttons for the major highways. All special signs for this District, such as detour signs and direction signs for the location of various Federal and State highways in cities, are also hand painted in this shop.

The stall adjacent to the sign shop is used by the bridge crew for the storage of its tools and special repair trucks. Next to this is the stall reserved for the equipment of the state maintenance man who is responsible for the maintenance of all state roads in Carroll County. There is one man specially assigned to work for each county in the District.

(*Continued on page* 48)

C. & E. M. Photo

The Cleaver-Brooks 2-car booster-heater owned by the District Garage at Carrollton, Ky., being moved into position for service in the yard.



The new Marlow Mud Hog.

New Diaphragm Pump Of Modern Design

The Marlow Mud Hog diaphragm pump was developed in 1924 and the first unit sold is still in use after 16 years of steady service, while many of these pumps were used in the construction of the Eighth Avenue Subway in New York City in 1925-27 and are still used today by the same contractors.

With the passing years, however, both engine and pump have been improved and the 1941 Marlow Mud Hog is entirely modernized, with oil-immersed gearing fully enclosed, a more compact design with a lower center of gravity, and equipped with a powerful air-cooled engine. This Mud Hog is a diaphragm force pump having ball valves in patented valve chambers which provide immediate accessibility in case of clogging. The large passageways with minimum interference from the valve guides permit greater capacity because of lessened friction, according to the manufacturer, and the reduced back pressure because of the lower friction loss means less wear and tear on the pump, particularly on the diaphragms.

The Mud Hog is available in 3 and 4-inch sizes, providing 3,000 and 6,000 gpm, respectively, at a 10-foot suction lift, or 1,500 and 3,000 gpm at a 20-foot suction lift. For easy portability the Mud Hog is now also available with a pneumatic-tired wheel mounting at a slight additional cost over the standard steel wheel mounting. The pneumatic tires are of the double-tube type, although single-tube tires are also available.

Copies of Bulletin 40-D describing in further detail and illustrating the Marlow Mud Hog may be secured by those interested direct from Marlow Pumps, Ridgewood, N. J., or from this magazine.

Catalog on Safety Hats, Belts and Foot Guards

One safety belt out of approximately two hundred is called upon to save a life. Will this one belt do its work? The Strauss Co., 925 Liberty Ave., Pittsburgh, Penna., manufacturer of safety belts, protective hats and foot guards, states that the Pittsburgh Testing Laboratory has tested all its materials separately for tensile strengths, and has conducted scientific drop tests with a rope dummy to determine what a completed belt would do when called upon to save a life. The results of these tests may be obtained by writing direct to the manufacturer and asking for "Test Pamphlet on Safety Belts." Also available is its Catalog No. 41 which contains descriptive data on the Strauss line of safety equipment.

Air and Water-Cooled Gasoline Engines

The Lauson Co., New Holstein, Wis., has available a complete catalog devoted to its line of 4-cycle engines, both air and water-cooled. Air-cooled models range from the RLC ½ to ¾-hp engine, suitable for portable pumps and other installations requiring light weight, to the UAS 3.8-hp engine, including dustproof models and models equipped with gear speed reducers with ratios of 4 to 1 and 6 to 1. Construction features include a flyball-type governor for close speed regulation suitable for generator service, aluminum cylinder heads for better cooling and high-tension flywheel-type magneto ignition.

The water-cooled engines range from the RCR 1-hp engine to the ZWR 5½-hp model, all of which, with the exception of the 1-hp engine, are equipped with Timken roller bearings. Other features include the positive pump and splash system of lubrication, Moss type air cleaner, or oil bath optional at extra cost, and high-tension flywheel-type magneto ignition.

All models are described and illustrated, specifications are given, and there is a list of authorized Lauson service distributors in the back of the catalog. Copies may be obtained direct from the manufacturer.

High Pump Stations For Flood Project

Six Similar Structures Built by Norton & Nadalin In Ironton, Ohio, Levee and Concrete Flood Wall Work

(*Photo on page 56*)

✦ PUMP Station No. 5 of the six built by Norton & Nadalin, contractor of Columbus, Ohio, on the Ironton, Ohio, Flood Protection Project under the direction of the U. S. Engineer Department is the tallest of the group. It is 72 feet high from subgrade to roof, 29 feet inside diameter and has a wall uniformly 18 inches thick. The first lift was poured monolithic 20 feet high, and all others to the top, 12 feet high. Each of the stations has four seepage fins, two at each side, 5 feet apart, of 20-ounce sheet copper 30 inches wide extending from the foundation for the entire height of the levee and imbedded 6 inches in the concrete wall to prevent flood waters against the levee seeping by the station and causing a possible break in the protection system.

Outside and Inside Forms

The outside forms for the cylindrical shell were built up of oiled plywood backed by 1 x 4's with 1¼-inch spaces between the backing lumber. These were held to the proper curvature by shaped wales comprised of 2 x 4's about 6 feet long at the top doubled by a second line with the joints broken. Below the top the wales were all single 2 x 4's spaced 18 inches on centers. The panels were 4 and 8 feet in height. The vertical wales were composed of double 2 x 4's and held to the inner forms by Dayton tie rods.

The scaffolding which was carried as a unit from the ground up was comprised of 4 x 4 posts tied to the steel reinforcing for lateral stability. Decking was placed at convenient intervals where the men worked on the 4 and 8-foot panels.

The inside forms were a duplicate of the outside forms with the wales convex instead of concave and braced radially from a 4-foot square well built up of 4 x 4's and double 2 x 4 posts.

Concreting

As with all of the work on the Ironton flood project, including the concrete gate abutments, concrete flood wall and the pump stations, the concrete was supplied by a local ready-mix commercial plant and delivered as required in 1¾-yard Jaeger truck mixers. The contractor used an Insley steel mast anchored by four guys to dead men in the ground, for raising the Jaeger 6-cubic foot concrete buggies to the various heights of pours, and concrete was then poured through 6-inch elephant trunks to the bottom of the forms. All concrete was thoroughly vibrated in place to insure maximum density and absence of honeycomb.

Curing

The forms were required to remain in place 48 hours and were then stripped and the structure immediately coated with a cold application of bituminous waterproofing supplied by the Solvents Plastic Co. of St. Louis, Mo.

Personnel

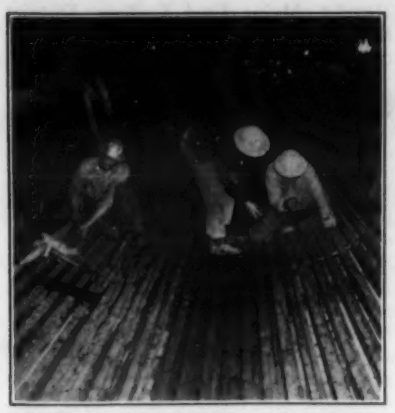
The contract for the six pump stations in the Ironton, Ohio, Flood Control Project, was awarded to Norton & Nadalin, contractor of Columbus, Ohio, on the low bid of $135,000. The work was done under the direction of the U. S. Engineer Department, Cincinnati District, Major Fred T. Bass, District Engineer. Field inspection was in charge of William J. Horrigan.

C. & E. M. Photo
Construction of Pump Station No. 5 at Ironton, Ohio.

Corrugated Pipe and Drainage Applications

The Gohi Culvert Manufacturers, Inc., Newport, Ky., has recently issued an interesting and instructive catalog on corrugated pipe and its application to drainage requirements. The pipe and its manufacture is described in detail and information is given on its use for highway drainage, under fills, for preventing embankment erosion, in bridge replacement, for railway and airport drainage, and many others, along with data on the installation of Gohi pipe. The back of the book is given over to tables and technical data on drainage design.

Copies of this illustrated catalog entitled "Gohi Corrugated Pipe" may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



Tying together the steel rails which line the 9-foot tunnel to protect the concrete from wear from rocks.

Drying and Placing Material in Dam Core

(*Continued from page 2*)

to radial gate, is of square cross section entirely lined with semi-steel castings.

Preparation of Dam Site

In the meantime, scaling of the canyon walls and the removal of material to uncover bedrock at the bottom of the canyon were under way. Portions of the wall were almost vertical, but it was scaled to give a very slight slope toward the top, to produce a wedging action when the heavy materials were in place in the dam. Other parts were naturally more sloping and were covered with loose material ready to slide at the least disturbance. This was cleared off by men with bars, and by necessary drilling with Gardner-Denver jackhammers and shooting with light charges of explosives. On all of this work, it was necessary to operate from safety scaffolds and life lines, and very close guard had to be kept against falling rocks and miniature avalanches. This is a more than ordinarily hazardous undertaking from the construction standpoint, but fortunately there have been few accidents and injuries, due to the elaborate safety methods supervised by safety engineers for both the contractor and the U.S.E.D.

There were two small streams coming in from the side and passing over part of the dam area. The water from these streams was collected and piped downstream well away from the working area. As it flows down a steep incline, over loose rocks, it would have been difficult to keep any ordinary intake from clogging up. So a short concrete flume was built, from which the pipe takes off, and over this was constructed a grid somewhat like an ordinary grizzly. Rocks coming down pass onto this grid but not through it and can readily be cleared off when there is sufficient accumulation.

Another sizeable preparatory job the contractor had was the construction of a road from the quarry site to the dam site, a distance of some 4 miles. A good road is required for the heavy-duty rock-laden trucks, and it has been provided. At one point it crosses a highway, and there it has been provided with traffic lights.

Dam Has Impervious Core

The dam consists of a central water-tight core of impervious material supported by slopes of quarry rocks and boulders of various sizes, with a transition zone of fine rock between. By virtue of its great weight, the rock fill is easily able to resist the horizontal water pressure against the dam. Because the rock fill is not water-tight, the central core will be a mixture of sand, gravel and clay, compacted tightly to prevent leakage. Rising 425 feet above lowest bedrock, the dam will be approximately one-third of a mile in width, from toe to toe.

The pit from which the material for the core is being obtained is situated about a mile from the dam. The material is being transported on a rail line, in 30-yard Western and Magor air dump cars, pulled by Shay 70 and 80-ton locomotives, and is deposited in a storage pile near the head of the spillway. This same line and equipment were used in removing excavated material from the site.

At this point an unusual procedure, calling for special equipment, is begun, as all the material for the core is dried to an optimum moisture content.

Drying Core Material

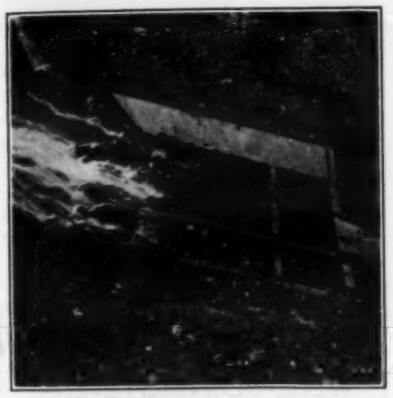
In the drying plant system are three special driers designed and manufactured by the Madsen Iron Works, Huntington Park, Calif. These driers are the revolving drum type, oil-fired, and are designed for continuous operation. Each is 72 inches in diameter and 28 feet long, driven by a 40-hp motor. In their stacks are 20,000-cfm blowers which create an induced draft through the driers as they revolve.

The material is fed continuously into the driers from a bunker, being brought to the latter by a 36-inch belt conveyor from the storage pile. The capacity of each drier is approximately 60 cubic yards an hour and reduces the moisture content from an average of about 20 per cent to an average of about 16.5 per cent.

Placing Core Material

Leaving the driers, the material is taken to the edge of the canyon by a 36-inch belt conveyor and discharged into two wooden storage silos, each 20 feet in diameter x 30 feet high, from which,

(*Continued on next page*)



A miniature diversion dam for one of the small streams was provided with a grid for screening out rock before the water enters the pipe system.

Preparing Rock Fill At Mud Mountain Dam

(*Continued from preceding page*)

by means of 60-inch conveyor-type feeders it is placed in 9-cubic yard buckets handled by two Pacific 30-ton stiffleg derricks with 102-foot booms and lowered to the core surface.

This method of placing was selected for a number of reasons, chief of which was the fact that any type of gravity chute would result in a certain amount of separation of the materials. Also there was the matter of safety to be considered, for with any type of sliding-gravity arrangement to such depths, there would be danger from flying rocks and pebbles which, even if comparatively small, would present a hazard.

The material is placed in the core in 6-inch layers, using a Trackson shovel on a Caterpillar D4 and D8's with LeTourneau bulldozers for spreading. Each layer is thoroughly compacted with sheepsfoot rollers. Two new Model F Carryall scrapers will be used for spreading core zone material on the dam at higher elevations.

Work at Quarry

By November 15, the quarry had been partially stripped and a large face opened by a 10-ton shot of explosives. Two Bucyrus-Armstrong Model 29-T blast-hole drills are used at the main quarry site for rock production for the rock fill. Blasting also includes coyote-hole methods and considerable jack-hammer drilling, for which Gardner-Denver S55 jackhammers are used with both conventional drill steel and Timken detachable bits. A Bucyrus-Armstrong Model 12 bit-dressing machine is used at the main quarry for sharpening blast-hole drill bits. The blasting is done with Atlas powder. Compressed air for the project is furnished from plants at the main camp and each of the two quarries, equipped with one Sullivan 1,100-cf, two Ingersoll-Rand 1,100-cf, two I-R 750-cf electric-driven compressors and one Gardner-Denver diesel portable 315-cf compressor.

The rock is loaded by a Bucyrus-Erie 120-B 5-yard electric shovel to twenty Western 20-cubic yard dump trucks, of new design and made by the Knuckey Truck Co. of San Francisco, and powered by Cummins 200-hp diesel engines, and six Western 12-cubic yard dump trucks with Cummins 150-hp diesels.

Equipment

Included in the other equipment on the job are a Northwest 80-D diesel, used in spillway excavation, and now in use at the borrow pit loading core zone material into dump trucks for delivery to the borrow pit screening and loading plant; a Lorain 75A 1¼-yard gasoline shovel and a Lorain 40 ¾-yard gas unit have been used on miscellaneous work such as road construction, stripping, trench excavation and handling of equipment and materials, serving as cranes and draglines as well as shovels; and the rented Northwests which were used on road construction and spillway excavation as well as for river-bed excavation. There are ten D8 tractors on the job, in use on clearing and grubbing, road and trestle excavation, spillway excavation, river-bed excavation, borrow-pit and quarry excavation, as well as for placing material in the dam. A LeTourneau J-12 scraper has been used

(*Concluded on page 53*)

George Kaiser, at the left, and his son Ellsworth and their International-powered Adams graders with which they maintain local roads in Minnesota.

Roads Maintained By Father and Son

Minnesota Contractor, With Son, Uses Two Units To Maintain 240 Miles Of Road Under Contract

✦ THE old adage "Like Father, like Son" has a double application in the career of George E. Kaiser, contractor, of Danube, Minn., who has been engaged in road maintenance work ever since, as a boy of 18, he maintained 7 miles of road for his father, using first a four-horse wooden drag and later a two-horse 8-foot blade. Now, with the contracts for maintaining 370 miles of township, county and state-aid roads, Mr. Kaiser's 24-year old son, Ellsworth, is proving to be a "chip off the old block" by assisting in this work.

Advancing from the old horse-drawn maintainers to his first power unit, Kaiser bought an Adams grader and a Model 20 International wheel tractor. But time marched on and in February, 1936, he purchased an Adams motor grader, powered by an International PD-40 diesel unit. In January, 1939, with more mileage to cover, he purchased a second similar unit, which was operated by his son. In August, 1940, Kaiser purchased two more machines duplicating his other units. All of the graders have an electric lighting and starting system, scarifier, and snow plow.

Summer and Winter

Sometimes during the summer Kaiser works with a contractor on road construction and oil mixing during the day, then proceeding with his regular maintenance job at night.

But during the winter, when Minnesota snows start to pile high, he finds himself very much occupied keeping 90 miles of road open to traffic. The worst conditions, he says, were encountered during the winters of 1936-37 and 1937-38, when highway drifts were often 10 and 12 feet deep.

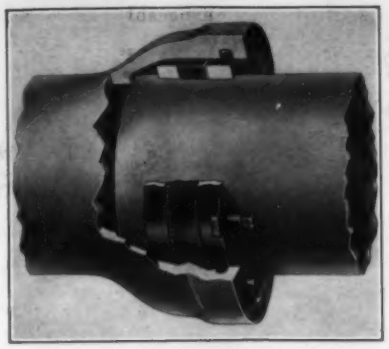
Cost records show that on heavy grading the PD-40's use up to 2 gallons of fuel an hour but on a regular maintenance, the average is 1.37 gallons an hour. Oil is changed every 60 hours, none being added between. Mr. Kaiser says it pays any owner to pick a good grade of oil and use it exclusively.

Repairs on the two units have been minor, the total expense for the older unit after nearly four years of service having amounted to only $73.10. In that time, the unit had been operated 8,407 hours.

Shovels, Draglines, Cranes

A new 16-page illustrated catalog, No. 1885, has been issued by the Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago, Ill., devoted to its 2 to 3-cubic yard Speed-o-Matic Series 500 shovels, draglines and cranes. Among the features pointed out are welded unit construction, interchangeable crawler side frames, self-guiding non-clogging treads, self-aligning rotating rollers and center pin bearings, and high ground-clearance. Other pages present dimensions, clearance diagrams, working ranges, lifting capacities, and specifications.

Copies of this catalog may be obtained by those interested direct from the manufacturer by mentioning this magazine.



A cut-away view of the new Dresser Bellmaster joint for cast-iron pipe.

New Type of Joint For Cast-Iron Pipe

The new Dresser Bellmaster joint, Style 85, recently announced by the Dresser Mfg. Co., Bradford, Penna., is designed to provide a simple easy-to-install mechanical joint which will last as long as the cast-iron pipe on which it is used. This new joint is a single-gasketed self-contained mechanical joint said to be strong, flexible and corrosion-proof. It consists of an inner ring, an armored gasket, an outer ring, and a set of capscrews, all factory-assembled into a single unit.

To install the Bellmaster joint, it is simply inserted in the bell end of the pipe prepared to accommodate the joint, locked in place by twisting slightly clockwise, the spigot end "stabbed in," and the capscrews tightened. As the capscrews are tightened, the inner ring is drawn closer to the locked outer ring, thus expanding the gasket against the outside of the spigot and against the inside of the bell, making a tight seal against both. The only tool needed for installation is a small ratchet wrench, and it is stated that an ordinary workman can install one of these joints in from 2 to 5 minutes.

The Bellmaster is completely enclosed by the bell of the pipe in which it is inserted, so that there are no exposed parts or outside lugs. The large-section resilient gasket provides for deflection in any direction, as well as longitudinal movement caused by expansion and contraction. It is stated that in the smaller sizes, the joint can be deflected through an arc of as much as 18 degrees without impairing its tightness or efficiency.

At present, the Style 85 Bellmaster is available in CIP sizes of 4, 6, 8, 10, 12, and 16 inches. Other sizes will be available soon.

Pneumatic Paving Breaker For Concrete Demolition

The Rapid Pavement Breaker Corp., 607 DeGraw St., Brooklyn, N.Y., manufactures a pavement breaker for all types of concrete demolition, on roads, trenches, bridge decks, foundations, floors and buildings, for tamping and for breaking frozen ground. It can be mounted on any 2 or 3-ton truck, uses a 215-cubic foot compressor, has a cutting width of 6 inches to 10 feet, works on a 5-foot radius, and delivers sixty 15,000 foot-pound controlled blows per minute.

A bulletin issued by this company describes the machine in detail and contains illustrations showing the Rapid pavement breaker in operation on various types of jobs. Copies of this bulletin may be obtained by those interested direct from the manufacturer.

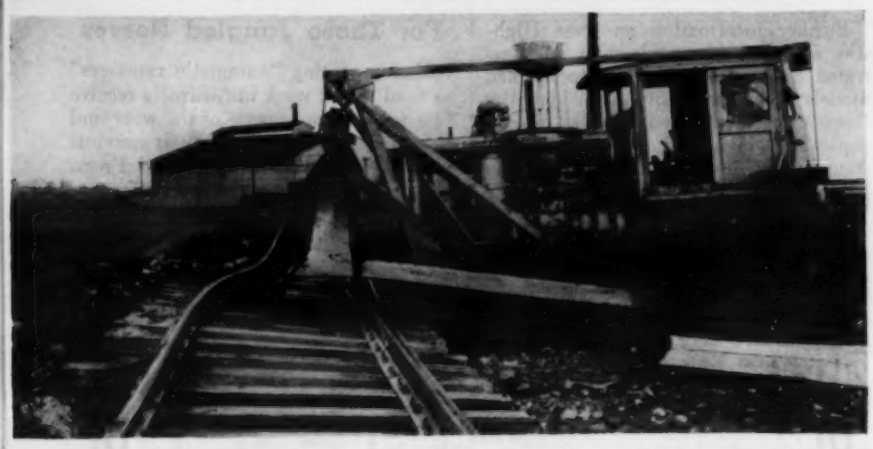
New Highway Scarifier

The new scarifier made by the Highway Equipment Co., Inc., 720 First Ave., N. W., Cedar Rapids, Iowa, consists of four sections, each 15 inches wide, and fits the moldboards on all makes of graders and motor patrols. Two clamps hold each section onto the moldboard and they may be changed from one machine to another in less than 5 minutes, according to the manufacturer. The teeth are removable merely by pulling out the cotter keys and removing the shafts. Two types of teeth are available, No. 1 for use on gravel and black-top work and No. 2 for use on oil roads and ice.

Further information on these Highway scarifiers is contained in an illustrated catalog on the 1941 streamlined models of highway equipment made by this company, which will be glad to send copies to interested contractors and state, county and township engineers on request.

For Those Jangled Nerves

Men operating "automatic rammers" on road repair work in Australia receive $2 a week extra because of the wear and tear such work entails on their nervous systems, according to the United Press. This is known as "nerve money."

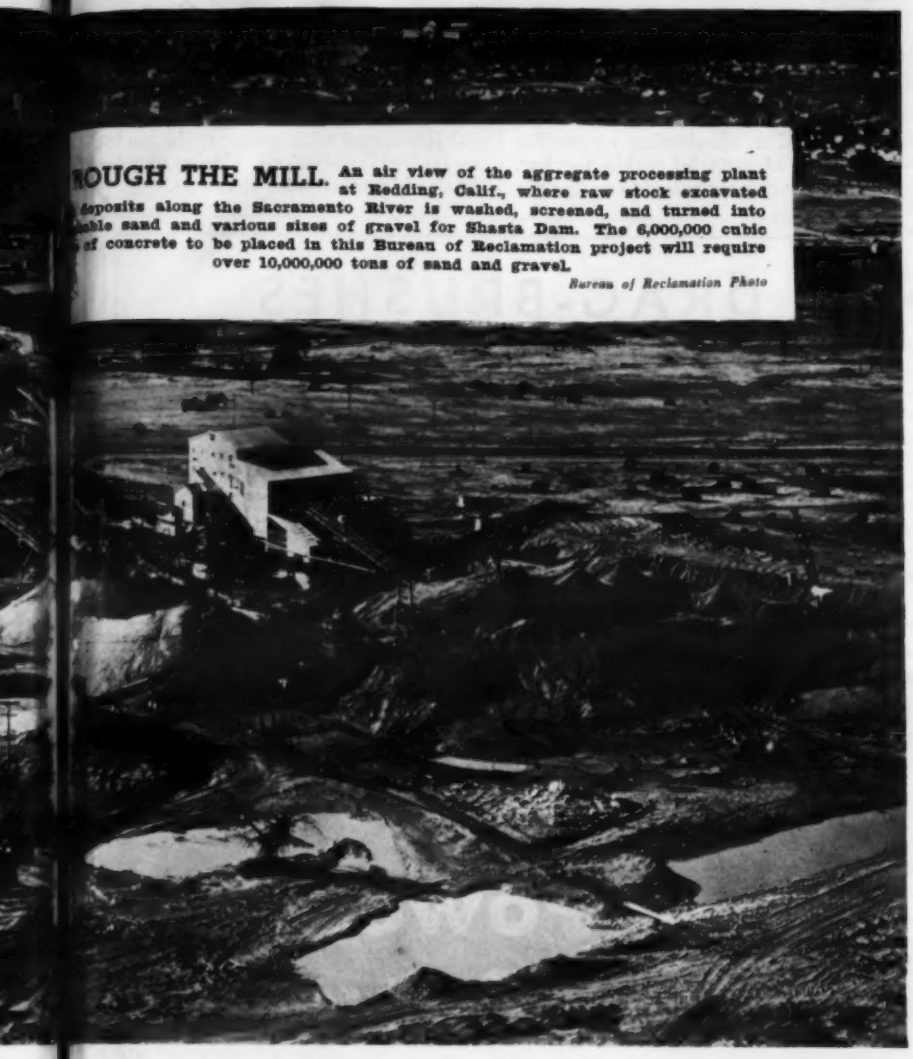


MAKING TRACKS move as needed. Here's a practical rail-lifting and setting unit, consisting of a Caterpillar D8 and an overhead frame and hinged arm, which made quick work of moving track at a Timken Roller Bearing Co. steel-mill dump. Such an outfit could be put to good use for track shifting on railroad-embankment contracts.

BANKSLOPING. A. L. Lawlor of Gordon, Georgia, used two Carryalls pulled by D7 tractors as banksloping outfits on new highway construction near Gordon. The machines each worked 14 hours a day, moving 8.5 cubic yards a distance of 200 yards 12 times an hour.

SAVINGS for tractor owners result from rebuilding worn tractor lugs by arc welding. Here a Hobart portable gasoline-powered arc welder is being used to rebuild lugs by welding on ¾ x 14-inch bars of steel.

LIGHT for night work at Green Mountain Dam in Colorado, part of the Bureau of Reclamation's Colorado Big Thompson Project, is furnished by General Electric floodlights mounted on tall towers, (shown at the right), strategically placed about the job. This earth and rock-fill dam on the Blue River will be 309 feet above the stream bed, have a crest 1,300 feet long, and contain 2,760,000 cubic yards of earth and 1,557,000 cubic yards of cobble and rock fill and riprap. Warner Construction Co. of Chicago is the contractor.



ROUGH THE MILL. An air view of the aggregate processing plant at Redding, Calif., where raw stock excavated deposits along the Sacramento River is washed, screened, and turned into sable sand and various sizes of gravel for Shasta Dam. The 6,000,000 cubic of concrete to be placed in this Bureau of Reclamation project will require over 10,000,000 tons of sand and gravel.

Bureau of Reclamation Photo

GIRAFFE? The well-known giraffe's reach is put in the background by this Lima 1001 crawler crane with 140-foot boom which is placing concrete in one of the piers for the Antler Bridge, being built by the United Concrete Pipe Corp. as part of the highway relocation around Shasta Reservoir. The pier will be 172 feet high from lowest foundation to the top.

COUNTY- owned TD-18 crawler tractor and Isaacson bulldozer and 10-yard scraper regrading, building up and leveling a 2½-mile stretch of farm-to-market road in Clark County, Washington.

FORMS. Giant wooden forms, shown at right, for 19-foot 6-inch 90-degree elbow valves, made by Associated Contractors, Inc., Valhalla, N.Y., for one of the shafts on Contract 306 on the Delaware Aqueduct. Carroll Graffiin, Carpenter Foreman, who supervised building the forms, is leaning against the back of the form.

At left is J. E. Small, Superintendent of all surface concreting for Associated Contractors. Mr. Small spent 3 years at Grand Coulee Dam. The Delaware Aqueduct, a major project in the East, is being carried on with unusual speed for this type of work and will add 540 mgd to New York City's water-supply system.

Characteristic block sodding around a drain inlet on a 3.6-mile grading and drainage contract to relocate U.S. 190 in Tyler County, Texas.

Controlling Erosion On Texas Roadsides

(*Continued from page 22*)

curred to date.

In one of the deepest cuts, a red clay hill, Sta. 98 to 105, the backslopes left and right were constructed with 2 to 1 slopes. The minimum and maximum depths of exacavation were 10 and 18 feet respectively. On these backslopes it was difficult to place mulch sod successfully and the engineer was in a quandary. Block sod would have been ideal, but the cost of planting this large area with solid sod was prohibitive. Trench sodding was considered but the engineer was reluctant to approve this type of sodding for this particular kind of clay. The Superintendent suggested placing longitudinal lines of 1 x 4-inch timber on 10-foot centers on the slopes. The timbers were pegged to line by means of wooden stakes. Then the mulch sod was placed between these lines of boards and for their full depth. The boards solved the problem and held the sod in place during spreading and sprinkling. Shortly after this sod had been placed there was a heavy rain, and this mulch sod would have been practically all washed into the ditch and down the waterway had it not been for the protection afforded by the boards. Through this cut, the ditches and the lower 5 feet of the backslopes were planted with solid sod, which although not specified in the plans was readily agreed to by the Superintendent.

At Sta. 145, Rt., there is a fine spring at the foot of a large magnolia tree. This spring is approximately 100 feet from the center line of the highway and is in a deep ravine. Mr. Spencer cooperated with the Resident Engineer in building a system of diversion dikes around this spring to insure its preservation.

Personnel

This 3.6-mile grading and drainage project was awarded to Oran Speer of Alvord, Texas, for $67,544.95. Work was begun in December, 1939, and completed on May 18, 1940. The late James Spencer was Superintendent for the contractor and because of his unusual cooperation and helpful suggestions which greatly added to the satisfactory completion of the work was nominated for one of CONTRACTORS AND ENGINEERS MONTHLY's Roadside Development Awards for 1940.

For the Texas Highway Department, for which Jac L. Gubbels is Head of Roadside Development, W. E. Suter was Resident Engineer.

Catalog on Spray Bar for Bituminous Distributors

The Walker-Bar is a patented spray bar, light but sturdily constructed, especially designed for all types of bituminous distributors. According to the manufacturer, the Walker Machine Works, Sullivan, Ill., it provides instantaneous and positive start and stop of the spray of any kind of road material, such as road oil, emulsified asphalts, cut-back or paving asphalts, without dripping or dribbling. A control lever, operated either from the cab or the rear end, actuates a sliding steel plate fitted with cut-off ball valves at each nozzle. There is full end-to-end circulation of the hot material under pressure while the distributor is in operation, eliminating congealing or freezing of material within the bar. The bars are quickly raised to an upright position for traveling or drainage without the use of any tools.

An informative bulletin has recently been issued by the Walker Machine Works describing its spray bar in detail and illustrated with photographs showing typical installations. Copies may be obtained by mentioning this item.

The new B-E power control unit for cable-operated tractor equipment.

New Power Control Units

A complete line of single and two-drum power control units for operating cable-controlled equipment on International TracTracTors and other tractors has just been announced by the Bucyrus-Erie Co., South Milwaukee, Wis. According to Bucyrus-Erie engineers, excessive heat, the arch enemy of dependable winch operation, has been defeated in the new B-E planetary-drive winch.

The clutch and brake drums are separate and each drum has but one heat-generating surface; the bands are external and contact 93.8 per cent of the full circumference of the drum, spreading friction pressures over a large area so that less heat is generated at any one spot. All bands and drum friction surfaces are exposed to open air to assure prompt heat dissipation, so that heat is carried off before it can build up to damaging temperatures, according to the manufacturer.

The wide large-diameter external clutch and brake bands are interchangeable and one handy-to-reach adjustment on each band, in full view of the operator, compensates for wear. The bands are easily replaced in the field with ordinary tools, and without disturbing oil seals or bearings. The design of the brakes and clutches provides cushioned starts and stops, to lengthen rope life and protect tractors and equipment. Rope life is further safeguarded by the large-diameter properly aligned sheaves and a long lead angle to assure smooth reeving on the drum. It is stated that swinging fairlead sheaves stay properly aligned with the lead cable even on short turns.

Full details on these new Bucyrus-Erie single and two-drum power control units are given in a new completely illustrated Bulletin PCU-1, copies of which may be secured direct from the manufacturer or from this magazine.

Investigation of Natural Sandstone Rock Asphalt

The report of an investigation of the general physical characteristics of natural sandstone rock asphalt conducted by the Engineering Experiment Station of Purdue University in cooperation with the State Highway Commission of Indiana has recently been published.

A brief description of the geological formation and preparation of rock asphalt for road-building purposes are given; the effects of outside and laboratory curing on the physical properties of a soft rock asphalt are correlated in tables and charts; changes in stabilities with curing, studied by means of the Hubbard-Field method and the Kriegil minitrack, are reported; and a method of stocking rock asphalt and the effect of this type of curing on the physical properties are described.

Also included in this report is a brief summary of the observations of the service performance of rock asphalt surfaces in general, with photographs of satisfactory pavements as well as of some common types of failure in rock asphalt surfaces.

A limited number of copies of this Research Series Bulletin No. 78 are available to interested highway engineers and contractors free of charge. Address your requests direct to the Engineering Experiment Station, Purdue University, Lafayette, Ind., and mention CONTRACTORS AND ENGINEERS MONTHLY.

New Dump Body

A new dump-body style for 1941, announced by the Hercules Steel Products Co., Galion, Ohio, and known as the Girder-Trussed panel body, is available in all lengths, widths and capacities. The manufacturer states that over 6 feet of continuous side bracing on an 8-foot body gives this unit 4.2 times the strength of an ordinary braced side body, with 30 inches between spacing.

The ultimate function of a body side brace is to lessen the tendency of the side to sag and spread outward. This spread is caused by breaking down the top edge of the body. If the top edges of the body are kept straight, there can be no spread or sag of the body sides without stretching the metal itself. Therefore these Hercules Girder-Truss braces support the sides at the top.

The Hercules new dump body.

Descriptive literature on these new dump bodies may be secured direct from the manufacturer by mentioning this item.

Single and Double-Drum Sheepsfoot Rollers

Euclid sheepsfoot tamping rollers are available in two models, the 7M, a single-drum unit for individual or tandem operation, and the 8M, a double-drum roller of the oscillating type permitting each drum to pivot freely, following uneven ground contour. Available ground pressures per square inch vary from 119 to 295 pounds for Model 7M, and from 129 to 307 pounds for Model 8M, providing a range of compacting pressures to meet special contract specifications.

Complete details of construction and specifications are contained in a bulletin which The Euclid Road Machinery Co., Cleveland, Ohio, will be glad to send to those interested on request.

High-Pressure Cleaner For Highway Garages

Two new super-capacity Hypressure Jenny steam cleaners, Models J-L and J-M, recently announced by the Homestead Valve Mfg. Co., Inc., Coraopolis, Penna., are described in detail in a bulletin issued by this company. According to the manufacturer, these new models are more powerful, which means faster and more thorough cleaning of automotive parts, chassis, motors, machinery, floors, walls and exteriors of buildings. A new simplified automatic compound feed, greater portability through the elimination of all dead weight, and greater simplicity of construction and operation are among the new features included in these models.

Copies of this bulletin may be obtained by those interested direct from the manufacturer.

Portable Electric Tools

The line of Skilsaw portable electric tools for construction, production, and maintenance are described in detail in Catalog No. 42 recently issued by Skilsaw, Inc., 5033 Elston Ave., Chicago, Ill. Included are saws, drills, belt sanders, grinders, disc sanders, blowers, bench grinders and floor sanders. Various models of each tool are illustrated, specifications are given, and prices.

Copies of this catalog may be obtained by writing direct to the manufacturer and mentioning this item.

The new I-R pavement tester.

New Pavement Drill On 2-Wheel Trailer

A new pavement tester drill, mounted on a 2-wheel trailer which can be towed at speeds up to 35 miles an hour, has been produced by Ingersoll-Rand Co., 11 Broadway, New York, N. Y. Earlier models of these drills were either truck-mounted or self-propelled 4-wheel units which traveled at walking speed. The new trailer mounting allows rapid transit and ready availability, yet frees the towing truck for other work.

This new drill operates a 7½-inch diameter shot bit for securing test cores from concrete pavement. It is powered with a 4-cylinder Hercules Model ZXB gasoline engine with a 2⅝-inch bore and a 3-inch stroke. A large tool compartment and a built-in 25-gallon water tank are added features.

Safe Drinking Water On Construction Jobs

Quite frequently clear water for general use is available at construction camps but its freedom from pollution is not assured. To care for such temporary water supplies by furnishing sterilization of the water, a new belt-driven Hypochlorinator has recently been announced by Wallace & Tiernan Co., Inc., Newark, N. J. This new unit is especially adaptable where water is pumped by gasoline engine or where there is a drive shaft or power pulley available to supply the necessary motive power.

The construction of this new Hypochlorinator is of the same heavy-duty design as the other W & T units in this line. Pumping is accomplished in the same manner, using a somewhat heavier diaphragm. Gears and all moving parts run in an oil bath. Operating at 720 rpm, the unit pumps 60 gallons of solution in 24 hours against a back pressure of 30 pounds per square inch. Adjustment is by a crank arrangement giving a range of capacities of 4 to 1 at constant shaft speed. In addition, flexibility is provided by a change in shaft speed. Calibrations are arranged so that the same ratio applies between maximum and minimum, regardless of speed.

The solution being pumped comes in contact only with materials such as hard rubber, silver and glass which are resistant to corrosive solutions. Its use therefore includes pumping many chemicals in addition to hypochlorite solutions.

Catalog on Medium and Heavy-Duty Trenchers

Profit in trench work depends on the stamina and the ability of the ditcher to dig day after day without serious delays and replacement expenses. Antiquated equipment and methods can not successfully compete with today's construction schedules and costs. Modern engineering and extra heavy-duty construction are characteristics of the design of Parsons trenchers to insure economical operation up hill, down hill, and on the level, according to the Parsons Co., Newton, Iowa.

The Parsons Model 25 for medium-sized jobs and the Model 310, which has the same performance characteristics of the Model 25 but is larger, heavier, more powerful and offers a greater range of digging widths and depths, are described in detail in bulletins recently issued. Copies may be obtained from the manufacturer.

1941 Truck Models

An attractively colored, illustrated booklet has recently been issued by the Chevrolet Motor Division, General Motors Sales Corp., Detroit, Mich., on Chevrolet trucks for 1941. Models range from light delivery trucks to cab-over-engine units for trailer operation, each one of which is illustrated in color and described in detail. Truck specifications are given in the back of the folder along with data on Chevrolet's standard truck engine and the Load-Master engine.

C. & E. M. Photo
The end of the cribbed 70-foot span awaiting its new abutment.

Raising Old Bridge On Grading Project

(*Continued from page 17*)

the job. At the close of the job, two smaller shovels were used for final work.

The Shady Rill Road

The Shady Rill Road takes off from the main road close to the south end of the bridge and extends for a distance of 2,100 feet to serve the village of Shady Rill in Middlesex Township. This section involved the removal of 1,000 cubic yards of rock and 14,600 yards of earth. An excess of 2,000 cubic yards was taken back to the south approach fill of the bridge.

The Bridge Performance

The old 70-foot span steel I-beam bridge over Shady Rill was salvaged in a very interesting manner. The five 33-inch I-beams 73 feet 3 inches long, with the concrete deck, were unbolted from the old abutments. The curtain walls were broken clear from the abutment and slab with pavement breakers. The span was then raised intact a vertical distance of 22 feet. This work was subbed to W. B. Hill & Co., of Tilton, N. H., a building mover of considerable reputation and a specialist in raising structures.

The subcontractor put four double sets of cribbing under each end of the span with longitudinal and lateral ties from crib to crib every eighth timber. The standard cribbing was 6 x 6-inch timber 4 feet long and the tie timbers were about 12 feet in length. Foundation cribbing of 6 x 14-inch x 12-foot timber was placed 8 feet high on the coarse gravel river bed, each set of cribbing carrying two double sets of 6 x 6-inch x 4-foot crib. Every timber was put up with a carpenter's level to insure an accurate raising of the entire span.

As the bridge is skewed 15 degrees, extra jacks were necessary at the overhanging beam ends, the center line of jacking being 90 degrees to the line of the beams. Three screw jacks were used over each set of cribbing with one extra jack at the outside overhang on each end, making a total of fifty jacks to be operated in raising the complete span. Cross timbers 10 x 10-inch x 24-foot under the steel beams at each end of the bridge took the jack thrust and equalized the lift. One man worked on each double crib set at each end handling the six or seven jacks on that set. The foreman blew a whistle and then each man gave one-half turn to each jack for which he was responsible. When all of the men had completed their turns on the jacks, which required three to four minutes per round, there was a short wait and then the whistle was blown again for the next set of turns.

The design of the new structure called for the use of the bottom 6½ feet of the old bridge abutments with the abutment cap widened from 2 feet to 3 feet 6 inches. This was done by breaking down the seat of the old abutment and then pouring the widened section on top with forty-six ¾-inch x 5-foot steel dowels in each cap to bond the old and new concrete. On the new abutments 18-foot bents of five columns cross-braced were erected to carry the old span and the new approach span. The old span is being carried on brackets while the new approach spans have five 24-inch I-beams and are carried on top of the bents. The approach spans are 37 feet 6 inches total length, 34 feet clear span, and run from the bents to open abutments composed of two reinforced-concrete columns and with a reinforced-concrete cross beam. The two approach fills and the bridge proper total 1,400 feet in length.

An interesting commentary on the character of the workmen and on bird life in general is found in the story of a Phoebe bird which had a nest in the south end of the bridge on the lower flange of one of the I-beams. Before work was started in detaching the bridge from the abutment and raising the complete span, the nest was only 6 feet from where the men were working but the mother bird flew in and out regularly to feed the little ones after they had hatched. She would not fly in to feed them if there was anybody walking around the river bottom below but it made no difference if men were in the cribbing as close as 6 feet from the nest when they were jacking the span upward. Before the span had completed a little more than half of its upward trip the birds were strong enough to leave the nest. No time was wasted in this operation.

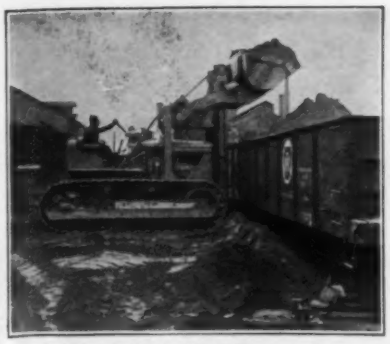
Personnel

Work on this contract, which was awarded to Lane Construction Corp. of Meriden, Conn., on its low bid of $88,409.97, was started May 7, 1940, with a completion date of November 1, 1940. For the contractor, Harold Hayden was Superintendent, and C. E. Putnam was Resident Engineer for the Vermont State Highway Department. For the subcontractor handling the raising of the span, W. B. Hill & Co., of Tilton, N. H., Brackett Hill was Superintendent.

Air-Powered Tools for Construction Industry

A new catalog describing the complete line of Thor air-powered tools for contractors has just been issued by the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill. It contains complete specifications for all Thor rock drills, paving breakers, clay and trench diggers, sump pumps, saws and associated air tools, and graphically depicts specific applications and uses for all the various tools. Detailed information on accessories and equipment for use with the tools is given and important construction features pointed out.

Copies of this catalog, No. 42, may be obtained by writing direct to the manufacturer and mentioning this magazine.



The new Model T 7 Traxcavator.

New Giant Added to Tractor Shovel Line

The addition to its line of Traxcavators recently announced by the Tracklson Co., Milwaukee, Wis., is said to be the largest tractor shovel ever built. Known as the Model T 7, it is available with a 2 or 2½-cubic yard bucket and is capable of handling any type of digging, dirt-moving or material handling, according to the manufacturer.

Designed for mounting on a Caterpillar D7 tractor, this Traxcavator unit is said to have great versatility and multi-purpose utility on digging, loading, grading and dirt-moving operations, not only as a shovel but also as a scraper, bulldozer, anglegrader and trailbuilder. The full 23,000-pound push of the tractor can be applied to the bucket to penetrate and dig tough soils, clay, caliche, shale or frozen ground. The unit travels around the job at speeds up to 6 miles an hour, turns in its own tracks, and is equipped with extended track frames and special fittings to give it stability and traction.

Copies of a new special bulletin on the Model T 7 Traxcavator may be secured by those interested direct from the manufacturer by mentioning this item.

New Cement Hose

A new line of cement-handling hose, built especially to meet the requirements and operating conditions created by new methods of bulk-cement handling, has been announced by the B. F. Goodrich Co., Akron, Ohio. This type of hose is used with machines which operate like a giant vacuum cleaner, sucking up the cement and blowing it through the hose at high velocity.

The new hose is made with a ⅛-inch tube of Armorite, a specialized rubber compound designed to resist abrasion; strong wrapped fabric; and round wire reinforcement, with a 3/64-inch rubber cover. It comes in inside diameters ranging from 4 to 6¾ inches.

Further information on this new Goodrich cement hose may be secured by those interested direct from the manufacturer by referring to this item.

Buda Opens New Office; Sales Mgr. Appointed

The Buda Co., Harvey, Ill., announced recently the opening of an office and display floor in Washington, D.C., at 1469 Church St., under the direction of Col. H. H. Frost, Vice President; G. C. Humphreys, Manager of Engineering and E. C. Asher, Office Manager.

Announcement has also been made of the appointment of Roy P. Williamson as Sales Manager of its Jack Division at Harvey, Ill. Mr. Williamson was until recently associated with the Gustin-Bacon Mfg. Co. of Chicago and St. Paul.

New Maintenance Trucks For Pennsylvania Highways

With the famous Pennsylvania Turnpike focusing nation-wide attention on its highway system and the National Defense Program making greater demands on its roads because of increased transportation of materials and manufactured goods in this important industrial area, the Pennsylvania Department of Highways is expanding and intensifying road maintenance and construction over the network of heavily traveled arteries in that state.

In order to carry on this program, a fleet of fifty new 3-ton Dodge Job-Rated trucks were recently put in service by the Department of Highways to be used for snow removal in the winter and for construction and improvement work in other seasons.

Soils Study Essential To Stable Runway Bases

(*Continued from page 7*)

trated in a reasonably small area, as compared with highway survey work.

In addition to securing information on the extent and arrangement of the soil layers, the surveyor also secures data on the elevation and fluctuation of the water table, the presence of seepage zones and layers of hardpan and similar information valuable to the designing engineer.

After the borings have been made, the engineer selects a representative sample of each soil encountered and sends it to the laboratory for analysis. Any method whereby a truly representative sample is obtained may be employed. Borings and test pits are most common but special sampling devices are also used.

Sometimes it is necessary to make soundings to considerable depths to determine the extent of deposits of unstable materials. When undisturbed samples are required as in the case of deep deposits of unstable material, it is necessary to employ more elaborate equipment. Often casings are driven, and special devices used to extract samples from the desired elevation. These operations are much more costly on most highway projects, but their feasibility is greater on airport work because of the concentration of activities to a relatively small area.

The soils surveyor should not confine his activities to the limits of the purchased right-of-way. As a part of his pre-construction investigation, he prospects and samples all possible borrow and material pits within economical hauling distance. By diligent inquiry and search, he locates possible sources of material for backfilling excavated areas, for subgrade topping or admixture, and, most important of all, he may discover adequate quantities of local materials suitable for base-course construction. On many highway projects, such discoveries have saved many times the cost of the survey.

Finally the soils survey data are prepared in the form of maps showing the location of borrow pits, and soil profiles showing underground conditions. The soil profiles combined with the results of laboratory tests on the samples taken furnish the design engineer with the essential information on soil conditions and are of prime value in the solution of subgrade problems.

Foundation Settlement

Consolidation tests combined with data secured in the field in regard to thickness and conformity of the soil layers provide a means of estimating the amount and rate of settlement which will be produced by filling operations.

There are a number of methods employed by the highway engineer for overcoming the detrimental effects of foundation settlement, but, with the exception of excavation and backfill with selected materials, it is questionable whether most of these are applicable to airports because of the width of the runways. One method which has found some use in both highway and airport construction is that of overloading during the early stages of construction. The purpose of this procedure is to bring about an early consolidation of the unstable material to a point where it will uphold the load which it is to support ultimately without excessive subsequent settlement.

In special cases the use of vertical sand drains, which have found some application in highway work, may be practical in airport construction over very deep layers of soft foundation material.

Subsurface Drainage

In highway work the engineer employs subdrainage primarily to intercept the lateral flow of water and less frequently to lower the ground water elevation at a particular location. In airport work probably the reverse is true, and subsurface drainage finds its greatest use in the removal of accumulations of underground water, although the importance of intercepting seepage water before it reaches the runways should not be minimized.

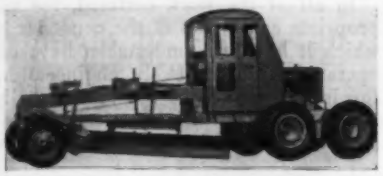
The principles of subdrainage for airports are substantially those for highways and may be summarized as follows: 1. Capillary moisture can not be removed by drainage; 2. Gravitational water can be removed by drainage; 3. Drains placed below an impervious stratum will not be effective in reducing the ground water elevation below the top of the stratum; 4. Intercepting drains, to be effective, must be placed at an elevation lower than the lowest point in the water-bearing stratum where it intersects the drainage line; 5. Trenches of intercepting drains must be backfilled with a material which is more permeable than the water-bearing stratum.

A prospective airport site in an area filled in by hydraulic dredging of a river channel. In such locations non-uniform soil conditions may be anticipated. Subdrainage will be a virtual necessity and unstable foundation materials will undoubtedly be encountered. Note the shrinkage cracks in the foreground, characteristic of undesirable subgrade soils.

Frost Heave

The physical laws controlling the occurrence of frost heave in soils have been well defined by workers in the highway field. Water freezes in certain

(*Concluded on page 46*)



One of the new Warco graders.

Line of Graders Have New Type of Control

The new line of motor graders recently announced by the W. A. Riddell Corp., Bucyrus, Ohio, includes several sizes of single-member-frame engine-over-transmission type machines, embodying the latest-type hydraulic power control system. This Hydromotor system is said to provide easier, smoother and faster control because the control levers only have to open and close and the hydraulic pressures in the lines do the rest. There are no universals or gears to shift in or out of position; the control lever acts as a release for the movement desired, and as the movement of the hydraulic fluid through the lines is constant, the response to the control lever is said to be instantaneous, resulting in faster control.

Other features of these new motor graders are their reversible blade, high-lift bank-sloping position, and power-controlled leaning front wheels. They are available with either hydraulic or manual steering mechanism. Built in several sizes, they are available with gasoline power units ranging from 31.5 to 65 hp, and diesel units from 39 to 66.5 hp. A deluxe all-steel fully enclosed truck-type cab fitted with safety glass is available for these machines, as well as 11 and 13-tooth scarifiers.

Bulletin No. 4100, describing and illustrating these new Warco graders, may be secured by interested contractors and state, county and township engineers direct from the manufacturer.

Motor Truck Scales

New structural features incorporated in its Truckmaster and Truckweigh motor truck scales are presented by the Toledo Scale Co., Toledo, Ohio, in a bulletin published recently. According to the manufacturer, the innovations listed and illustrated represent advanced truck scale engineering methods which contribute to scale accuracy plus lower maintenance cost.

Structural features of the new self-gaging pivots, suspension assembly, and the seven lever system with a guaranteed 100 per cent end loading are shown in close-up, detail photographs. Other illustrations show some of the scale installations that have been made during the past year, such as Toledo scales, equipped with Printweigh, which provide printed weight records of cement delivered to large construction jobs, and Toledos installed by state and county highway departments for official checking of truck weights.

Copies of this bulletin may be obtained direct from the manufacturer.

Commercial Standard for Portable Electric Drills

Announcement has been made by the National Bureau of Standards of a new commercial standard for portable electric drills (exclusive of high frequency) which is effective for new production beginning October 18, 1941. This standard provides minimum specifications for Class A heavy-duty and Class B standard rotary electric drills manufactured in eleven standard sizes ranging from 3/16 to 1½ inches, and covers the design, construction, minimum full-load ampere rating for each class and size of drill, name plates, and a uniform method of certifying compliance with the standard.

In order to assure the purchaser that he is receiving a portable electric drill which complies with the requirements of this standard, it is recommended that a label or certificate bearing a statement that the drill complies with all the requirements of Commercial Standard CS93-41 as issued by the National Bureau of Standards of the U. S. Department of Commerce accompany each drill.

Further information on the details of this standard may be secured direct from the Division of Trade Standards, National Bureau of Standards, Department of Commerce, Washington, D. C.

Summary of Progress On Pan American Route

(*Continued from page* 10)

reconnaissance surveys to report on the feasibility of possible routes, the probable cost, the economic service and such other information pertinent to the building of an Inter-American Highway, was authorized by Congress as part of the First Deficiency Act, Fiscal Year 1930.

Accordingly, highway engineers of the Bureau of Public Roads were sent by this Government to Panama in June, 1930, where they established an office in quarters provided by the Government of Panama, and from where they proceeded with reconnaissance surveys in Panama, Costa Rica, Nicaragua, Honduras and Guatemala, the five countries which had requested this cooperation (such a request having been made a prerequisite by the Legislation), the various Governments supplying additional assistance of various kinds while the surveys were in progress through their respective territories.

The Government of Mexico, to which the assistance of the United States was offered, expressed appreciation but replied that its National Highway Commission had been making and would continue to make the necessary studies and would carry out the further necessary work relative to the Mexican portion of the Highway. Neither did El Salvador request this Government's assistance, having previously explained that most of the route through its territory had already been located, much of it graded and part of it surfaced by its own highway authorities.

From about the middle of 1930 until nearly the middle of 1933 the reconnaissance surveys continued in these five countries. When the locations of the routes were completed and coordinated with the termini of the routes already determined by the Governments of El Salvador and Mexico, the engineers returned to Washington and made their report.

Report at Montevideo

The delegation of the United States to the Seventh International Conference of American States at Montevideo submitted a preliminary report of the engineers who had conducted the survey. This report showed that the construction of such a route was entirely feasible from the engineering standpoint and that of the total distance of 3,200 miles from Nuevo Laredo on the United States-Mexican border to Panama City, about one-third had been completed. The first part of this route connecting the United States with Mexico City, a distance of about 800 miles, was virtually complete, and the two capitals of Guatemala and Salvadore were linked by a stretch of passable though not entirely finished highway over 200 miles in extent. The longest completed stretch of highway outside of Mexico was in the Republic of Panama, from Panama City to David, a distance of over 300 miles.

Further Appropriations

An appropriation act passed by Congress and approved by the President in June, 1934, provided $1,000,000 to meet such expenses as the President deemed necessary to cooperate with the Central American Governments in connection with the survey and construction of the Inter-American Highway, the expenditure of this sum to be subject to satisfactory assurance from the various Governments of their cooperation in such survey and construction.

Another act, approved the same month, authorized the Secretary of Agriculture to expend not more than $75,000 for location surveys, plans and estimates for the Inter-American Highway, to provide continued cooperation.

More U. S. Participation

In March 1935, U. S. Bureau of Public Roads representatives reopened the Bureau's Panama office, and later established headquarters in San José, Costa Rica, for its representatives engaged in the cooperative work on the Inter-American Highway.

E. W. James, Chief, Division of Highway Transport, Bureau of Public Roads, visited the capitals of Panama and the Central American countries during April and May, 1935, to confer with the proper authorities regarding their desires with respect to this Government's cooperation in contemplated bridge construction along the line of the reconnaissance survey. Following this trip, Mr. James submitted a report on these conferences, including a plan for this Government's cooperation in a program of bridge construction, to be carried out under the $1,000,000 appropriation and the authorization for the Bureau of Public Roads to spend $75,000 in addition. Several subsequent trips to the interested Central American countries were made by Mr. James, one in the latter part of 1935, two in 1936, and one in 1937.

After work on three of the most strategic bridges was sufficiently advanced to know what their cost would be and therefore what unallocated balance would be available, arrangements were made for the cooperative construction of eleven additional smaller though none-the-less necessary bridges. All of the 14 bridges have been finished.

In addition to the construction of these bridges, the cooperation of the United States was requested, and granted, in the actual construction of sections of the Highway in Guatemala, Nicaragua and Costa Rica. Some of this work involved the construction of many additional small drainage structures.

In addition, U. S. engineers have completed a requested location survey about 30 miles long on the route of the Highway in Nicaragua and will effect an additional location survey of about equal length in the same country as well as an additional reconnaissance survey of nearly 60 miles for an alternative route, selected by Nicaraguan highway authorities instead of the originally reconnoitered route, to connect with the located route in Honduras.

Along the route of the projected Highway in Honduras, approximately 90 miles in length, United States engineers are cooperating with representatives of that country in completing the location survey. In Guatemala, besides continuing to cooperate on work previously begun, U. S. engineers are assisting in a location survey already about half completed for about 150 miles of the route through that country.

In all of the work outlined, the appropriate authorities of the countries in which it has been undertaken have cooperated with the U. S. engineers by furnishing the needed labor, all locally obtainable construction materials when needed, and a substantial share of the

(*Concluded on next page*)

Problem of Financing Pan American Highway

(*Continued from preceding page*)

funds required.

The South American Section

All of the cooperative work mentioned above has been confined to the Central American section of the Pan American Highway, known as the Inter-American Highway.

At the Conference of American Republics for the maintenance of peace, meeting at Buenos Aires, Argentina, in December, 1936, a Pan American Highway Convention was signed which declared the purpose to be "the speedy completion of a Pan American Highway."

Some of the signatory powers have not yet ratified the convention but several have already done so and a Financial Committee, composed of three of the ratifying governments — Mexico, Nicaragua and the United States—has been created. This committee has, as required, studied the problems, especially financial, concerning the speedy completion of the highway and has formulated and brought to the attention of interested governments, with a request for their comments, two reports, one a regular report of the Committee and a second one suggesting plans for financing the Pan American Highway.

As provided for in the fourth article of the Convention, the United States has designated the office of the Public Roads Administration to collect and disseminate information regarding the status of the Highway and the regulations governing its use.

Financing Is the Problem

The main problem in the completion of the Pan American Highway is that of its financing. At the Third Pan American Highway Congress in January, 1939, it was recommended to the Finance Committee and to the governments who need finances to complete their portions of the Highway that a non-profit finance organization be set up in which all of the interested governments can cooperate on a basis of absolute equality. This organization would help the Governments requesting it to secure on long terms and at reduced interest rates the necessary credits for the completion of their respective portions of the Highway; it would accept in its own name or that of a third party the guarantees which the Governments may offer for the fulfillment of the obligations contracted; it would issue its own bonds or certificates, guaranteed with the credits or bonds of the various debtor governments; it would guarantee with its own signature the payment of loans, the amortization of which is guaranteed in a satisfactory manner; and it would subscribe, purchase, sell and negotiate bonds which the Governments may issue for that purpose.

It might be mentioned here that loans have already been made by the Export-Import Bank to several of the Latin American countries for the purpose of aiding construction on those sections which are definitely a part of the proposed Pan American Highway. Under the terms of these loans it is expected that the greater part of the funds will be used in the purchase of American road-building machinery, equipment and materials not available in the countries where the projects are located.

Next Highway Congress

In September of this year the Fourth Pan American Highway Congress will meet in Mexico City, and at this Congress one of the principal items for discussion and agreement will be that of the proposed financing plan.

Although considerable work has been done by many of the Central and South American countries on sections of the Highway, a study of the accompanying tables of mileages in the various countries indicates that there is still plenty of work to be done before the Pan American Highway becomes a reality as a good paved road open to year-round travel.

The importance of the completion of this Highway has become even greater at this time because of the present chaotic condition of the world and the urgent need of solidarity, better cooperation and greater understanding among the nations of the Western Hemisphere.

Status of Pan American Highway

UNITED STATES TO PANAMA CANAL

	Paved	All Weather	Dry Weather	Trails	Total Miles
Mexico	857	188	265	402	1,712
Guatemala	—	306	—	—	306
Salvador	90	81	10	—	181
Honduras	—	30	29	31	90
Nicaragua	16	17	99	113	245
Costa Rica	54	—	52	250	356
Panama	163	145	34	25	367
Totals	1,180	767	489	821	3,257

PANAMA TO BUENOS AIRES VIA CHILE

Panama Canal to Colombian border	—	38	—	186	224
Colombia	—	742	68	165	975
Ecuador	193	262	262	—	721
Peru	783	883	—	—	1,666
Chile	145	1,452	—	—	1,597
Argentina	311	240	206	41	798
Totals	1,432	3,617	540	392	5,981

PANAMA-COLOMBIA BORDER TO BUENOS AIRES VIA BOLIVIA

Colombia	—	742	68	165	975
Ecuador	193	262	266	—	721
Peru	783	614	318	—	1,715
Bolivia	—	—	700	—	700
Argentina	583	568	88	83	1,322
Totals	1,559	2,186	1,140	248	5,433

BUENOS AIRES—MONTEVIDEO—RIO DE JANEIRO

Argentina	—	—	—	—	—
(Ferry)	31	—	—	—	31
Uruguay	311	55	25	—	391
Brazil	655	—	845	—	1,500
Totals	997	55	870	—	1,922

Institution Drives Laid With Road Mix

Roads Planned with Many Curves Complicate Use of Traveling Mixer, So Plant Moved to Commercial Pit

(*Photos on page 56*)

✦ THE grounds of the newly completed Southbury Training School at Southbury, Conn., are attractively planned and well landscaped, but the many curves on the 18-foot drives complicated the operation of the Barber-Greene traveling bituminous mixer and tamping spreader unit during paving operations. On the sharp curves, the delivery chute of the mixing unit swung too wide for the finishing unit to operate satisfactorily. So F. H. McGraw & Co., of Hartford, Conn., contractor for the paving, decided to move the mixing unit of the machine to the commercial gravel pit of B. J. Dolan at Bethel, 18 miles away. Another factor which led to the change was the difficulty of drying the windrows of wet gravel on the roads, which were in constant use by building contractors.

The contract, let by the Connecticut Department of Public Works, required the spreading and rolling of an 18-inch gravel base 18 feet wide primed with Texaco MC1 asphalt at the rate of ½ gallon per square yard. The prime was applied with an Etnyre distributor for the 18 feet, plus 1 foot 8 inches on either or both sides where the gutters were to be paved.

Plant Mixing at Pit

On a plateau well exposed to the sun and wind at the top of the Dolan gravel pit in Bethel, three separate double windrows of gravel were spread so that there would be one dry windrow for the Barber-Greene pick-up unit and the mixer unit to operate on while the other two were spread to dry and then forked and hoed into a single windrow when needed by the plant. The aggregate used was ¾-inch screened and crushed gravel, which was mixed with 5 per cent RC4 Texaco asphalt. The tank on the mixing unit of the Barber-Greene plant held 700 gallons. It was restocked from a Ford Brothers supply truck by means of a transfer pump on the supply truck, or by the Viking pump on the Barber-Greene machine. Two men operated the machines, one running the loader and the second running the mixer and watching the delivery of the material to the trucks. Two men on the truck, in addition to the driver, helped spread the material in the truck as it was delivered from the pug mixer of the B-G machine. The contractor was required to keep about twelve trucks in operation because of the 18-mile haul. The bodies of the trucks were oiled, usually on alternate trips, to prevent the sticking of the mix. The trucks made remarkably good time as all of the hauling was over paved roads although some of them were heavy-traffic Federal highways.

Spreading and Primed Base

The trucks delivered the mixed material to the spreading and tamping unit of the Barber-Greene traveling plant, which remained at the site of the paving and spread the layer so as to give a 2-inch compacted surface course 18 feet wide. As the spreading unit is self-powered the trucks backed up to the machine and delivered their loads and then drove away. One man rode the back of the machine to watch the edges, one man took care of the dumping, and two men worked on the surface touching up along the edges to insure a uniform line where some aggregate might have dropped out of line. A Buffalo-Springfield 10-ton gasoline roller was used to compact the base and was also used for rolling the surface course and the seal.

Sealing

The surface was sealed with ¼-gallon per square yard of RC4 Texaco asphalt applied by an Etnyre distributor, and then washed sand was applied by a Burch Chip-It-Over independently powered spreader attached to the tailgate of a dump truck which was then backed over the surface course. This was immediately rolled to secure a good bond and thereby provide a safe non-skid surface.

C. & E. M. Photo
Spreading plant-mixed road mix on one of the drives at the Southbury Training School in western Connecticut.

Personnel

The highway work of the Southbury Training School, Southbury, Conn., was in charge of E. J. Vaughan, Construction Supervisor, State Department of Public Works, Robert A. Hurley, Commissioner. For the contractor, F. H. McGraw & Co. of Hartford, Conn., John Royka was Superintendent for the placing of the gravel base and the 33,000 square yards of surfacing and seal.

Want information? Write the Editor.

Bin Capacities Are Affected By Cement Conditions

A recently completed investigation of the effect of the condition of cement on bin capacities and elevator ratings, made by a group of engineers not connected with any manufacturer of cement handling equipment, will be of interest to contractors and aid them in avoiding any misunderstanding in handling special cements.

Bin capacity and elevator ratings are based on standard portland cement, weighing 94 pounds per cubic foot. Allowance is made in these capacity ratings for some fluffing, but not sufficient allowance is made to cover the finer ground cements or conditions where the cement is fluffed to an abnormal extent due to the manner of handling. In other words, the capacity ratings are based on a standard range of compaction of the cement.

However, cement may be aerated or because of its nature or method of handling may weigh much less than 94 pounds per cubic foot. Certain cement in a loose condition may weigh as little as 60 pounds per cubic foot. For example, high-early-strength cements are more finely ground than standard cement and will fluff much more, so naturally it occupies more space per pound or per barrel.

In one of the cases investigated, involving a three-compartment bulk cement bin, it was found that when the compartments were filled with standard portland cement, each compartment held 355 barrels. When high-early-strength cement was used, each compartment held only 300 barrels, an immediate shrinkage of 15 per cent in the capacity of the bin and elevator. This installation is equipped with a 50-ton-per-hour elevator, but under the conditions cited the elevator rating drops to 42½ tons an hour with the high-early-strength cement.

In another case, in Texas, a contractor complained that the elevators of a two-plant installation were not delivering the rated 30 tons an hour. The investigating engineers discovered that the particular type of "standard cement" being used at this plant was fluffing considerably, so much so that it weighed about 66 pounds per cubic foot instead of 94 pounds. It was reported further that practically all of the cement now being furnished by Texas mills is ground very fine, which contributes to the fluffing and its light weight.

Because of this variation in the weight and space occupied by the various types of cement, it is advisable for contractors to take this into consideration when planning installations of bins and conveyors to handle bulk cement to be sure that the equipment will handle the required weight of cement per hour to match the production of the mixers or pavers.

Brake Linings, Blocks, And Clutch Facings

In a new illustrated brochure, Johns-Manville has gathered together comprehensive data on its complete lines of industrial brake linings and blocks and clutch facings for all types of industrial equipment. A feature of this brochure is a chart which simplifies the selection of the most suitable friction material for any specified service.

Supplementing this technical chart is another showing recommendations for specific types of clutches and brakes, and a third table giving the coefficient of friction, size limits, thickness, tolerances and recommended service conditions for each of the various types of J-M industrial brake linings and blocks and clutch facings.

Copies of this brochure, Form FM-7A, may be obtained direct from Johns Manville, 22 East 40th St., New York City.

One of two big cab-over-engine Model CJ 6-wheel Mack trucks recently purchased by Koppers Co. for use at its East Providence, R.I., plant. Their job is to deliver Tarmac from the plant to distributors' trucks on various projects. The unit shown carries 2,575 gallons.

After the site has been selected, the soil surveyor can start his work. Borings should be made to a depth of 5 feet below finished grade and deeper where soil and ground water conditions require.

Preparing Subgrade For Airport Runways

(*Continued from page 40*)

soils in the form of layers which grow at the expense of unfrozen water supplied by gravity or capillarity from a free water source. Under prolonged freezing action, the growth of these layers in the direction of the greatest heat transfer causes an upheaval of the surface which may amount to more than a foot. Where a non-uniform heave occurs, it may produce surface irregularities which are distinct hazards.

When the temperature rises above the freezing point, thawing starts at the surface and progresses downward, liberating the large quantity of water which has been accumulated in the form of ice layers. The still frozen undersoil prevents the water from escaping, with the result that the soil immediately below the surfacing temporarily provides low support. Unless the pavement possesses sufficient beam strength, failures in the form of breakage and displacement occur. This condition is known as a "frost boil" and is distinct from the frost heave which has been previously defined.

Whether or not frost heave will occur depends upon the quantity of moisture capable of being raised to a given height above the water table in a given time. Neither the height to which the water will rise by capillarity nor the rate of such a rise is alone the determining factor. In order to furnish capillary moisture in detrimental amounts, the pore size must be small enough to supply appreciable capillary pressure, but large enough to prevent too much frictional resistance to flow. These conditions are usually met in very fine sands and silts, and as a result the most pronounced heaves are encountered in these soils.

The most commonly accepted method of frost-heave prevention in highway construction is excavation of the frost-heave soils, which may usually be recognized by visual inspection, and replacement with granular materials. Other methods employing the use of deep drainage, insulating layers, and chemicals to reduce the freezing point have been tried to a limited extent only.

Selection of Material

Laboratory tests serve to identify the characteristics of the representative samples taken during the soils survey, and experience has shown that some types of soils are much more suitable for use in subgrades than others. Having predetermined the amount and character of material available on a particular job, the engineer can plan the grading operations so as to make the most effective use of the soils at hand. A layer of soils from 1 to 3 feet thick of the best available material should be placed directly below the pavement structure.

It would appear that material selection during grading operations should be simpler on an airport than on a highway project, as cross haul is materially reduced if not entirely eliminated, and the off-runway areas provide a suitable place for the less satisfactory materials, which is often a vexing problem in highway work.

Control of Compaction

The basic reason for compacting earth fills is to produce a soil mass which will not undergo subsequent excessive or unequal consolidation, will suffer minimum change in moisture content under changing climatic conditions and so will exhibit relatively small amounts of volume change, and will provide a satisfactorily high and uniform supporting power.

The theories of soil compaction in relation to moisture content are too widely known to need repetition. Suffice it to say that if a given amount of compactive effort is applied artificially to a given soil there is a moisture content, known as the optimum, at which the soil will attain the greatest weight per cubic foot. Each soil has its own optimum moisture content for the given amount of compactive effort, and every change in compactive effort produces a change in the optimum moisture content for a particular soil. The results obtained fully justify the additional cost, if any, of careful control of moisture content and compaction.

In highway practice, compaction tests are run on all soils to be used in the embankment to determine the weight per cubic foot and moisture content requirements. During construction, the moisture content is checked and adjusted and each layer is rolled until a satisfactory density is obtained. These same principles lend themselves readily to airport construction. Because of the great width of fill required, little or no interference between hauling and compacting equipment should be experienced. The borrow pits will be relatively much larger than on highway work and consequently it is more often possible to adjust the moisture content of the soil prior to excavation with a considerable resultant gain in efficiency. Finally, compaction to a uniform density should materially aid in maintaining the necessary smoothness of grade on the large runway areas.

A continuation of this discussion of airport-runway construction, based on a paper presented at the Thirteenth National Asphalt Conference at Dallas, Texas, will be devoted to base-course construction and will appear in our June issue.

New Catalog Describes Improvements in Wrenches

The Blackhawk Mfg. Co., Milwaukee, Wis., has recently issued a 40-page catalog featuring many 1941 developments in socket, box-type, tension and specialty wrenches for construction, industrial and allied fields. These include sockets with a Lock-On thumb-release device; easily cleaned, comfortable Gripline handles that replace cross-knurled grips; and a new 7/16-inch drive which is intended to replace both the 3/8-inch and 1/2-inch series of socket wrenches. Because of this general improvement, standard socket wrenches, with their interchangeable, quickly detachable units, build up to combinations adaptable to practically all jobs.

Copies of this No. 241 wrench catalog may be obtained by writing direct to the manufacturer.

Corrugated Metal Pipe

Penco corrugated metal culvert pipe is made from the best grade of galvanized culvert sheets with 2½-inch corrugations. Sheets are sheared to the proper size and after rolling to the required diameter, the pipe is riveted in the valley of each corrugation with round head rivets and properly upset. According to the manufacturer, it is sturdy, durable, easy to handle and can be installed quickly. Penco pipe can be furnished to meet various specifications.

A catalog entitled, "Corrugated Metal Culverts for Low-Cost Drainage" has been issued by the Penn Metal Corp. of Penna., Philadelphia, Penna., and contains descriptive data on its line of pipe and tables showing gages and lengths made in one section, and carry-load and water-carrying capacity of culverts. Copies may be obtained by writing direct to the manufacturer.

The new Littleford motorized portable patching roller.

New Patching Roller On Which Man Rides

When it comes to patching a roadway surface today, no matter whether it is in a city street, a county road, or state highway, you must have fast moving equipment. There are various types of power rollers on the market that trail behind a truck or are easily placed on equipment trailers, making is possible to move the roller speedily from one patching job to another. Littleford Brothers, 485 E. Pearl Street, Cincinnati, Ohio, has just brought out an entirely new Model No. 155 Trail-O-Roller.

To raise and to lower the wheels, a unique hydraulic arrangement lifts the pneumatic-tired trailing wheels off the ground. When the situation is reversed, the trailing wheels are on the ground and the roller drum is raised 8 inches off the ground. There are no rubber tires in contact with the finished surface, and with the detachable trailing tongue it is possible to use any kind of a truck to haul this roller. The roller width is 24 inches, designed to be narrow enough to roll service cuts. The front roller is 18 inches in diameter.

Some of the interesting facts about this No. 155 are that the operator rides on the roller, it is driven by a 7.75-hp standard automotive-type engine with two speeds forward and one reverse, the actual weight is 4,300 pounds, the rear roller gives 145 to 150 pounds per square inch compaction while the front roller gives 41 pounds. The rolling speed is 2 mph while for short distances in high gear it moves at 5 mph and it may easily be moved at 35 to 40 mph when trailing. It has a standard automobile truck type steering gear with a large automobile steering wheel. Complete information may be secured direct from Littleford Bros.

Blast-Hole Drills

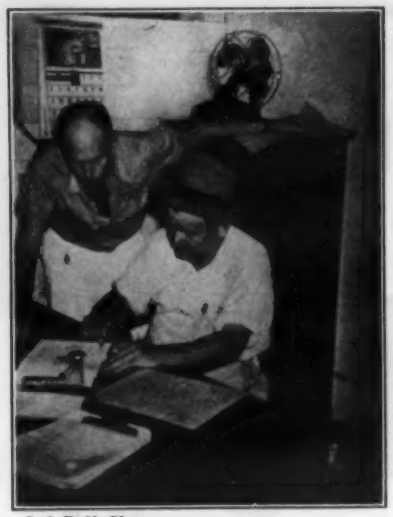
The Model 51 blast-hole drill, made by the Keystone Driller Co., Beaver Falls, Penna., is the latest in a long line of Keystone blast-hole drills, the first of which appeared nearly four decades ago.

The frame of the Model 51 is steel, both riveted and welded; it has a long, quick drilling stroke with four adjustments for length on the crank to give actual strokes of 23½, 27, 30½ and 34 inches, and five bearing adjustments for the double pitmans on the spudding beams, for qualification of lifting and falling speeds of the tools, to suit the constantly changing conditions in the hole. The derrick is the all-steel electric-welded telescoping type, with a power raiser and pantograph tool guide.

These and other features are described in detail in an illustrated bulletin recently issued by this company. Copies may be obtained by those interested direct from the manufacturer.

New C-P West Coast Manager

The Chicago Pneumatic Tool Co., New York City, announced recently the appointment of Frank B. Ridley as Manager of its San Francisco Office. Mr. Ridley succeeds H. P. Hansen who continues with the company in a sales capacity.



C. & E. M. Photo

W. D. Willoughby, District Garage Foreman (seated) and J. T. Sandefur, Clerk, check over the daily report at the Carrollton district highway garage in Kentucky.

A Typical District Garage in Kentucky

(*Continued from page* 25)

The fourth of the eight storage stalls is reserved for the roadside development crew which does the planting and cares for specially landscaped areas such as the attractive section on U. S. 42 east of Carrollton. The four remaining storage sheds, or stalls, are used for lumber, cement, steel, and when not so used house equipment, particularly during bad weather.

Outside Storage

In the yard, north of the storage garage and west of the repair garage, most of the heavier equipment is stored when not out in the field. In this area there is also a concrete ramp to a loading platform adjacent to the railroad siding, and next to this, a steel frame and chain hoist for handling particularly heavy parts and for the loading of heavy materials.

In front of the loading platform is a shed containing the blacksmith shop and the boiler room for providing steam for the road-oil pump which transfers asphaltic road oils from tank cars on the siding to the 10,000-gallon elevated storage tank from which the distributors and transfer trucks are loaded by gravity. One of the trailer-type Cleaver-Brooks 2-car booster heaters is usually used to heat the cars prior to the transfer of the material to the storage tank. South of the machine shop is an open storage lot where obsolete equipment which has served its usefulness is stored until the regular junk sales are held by the Department. At these sales, all of the materials are listed and bids are asked for the junk in each district.

The Repair Garage

The repair garage is a galvanized iron sheet metal building 62 x 130 feet, with a steel frame, wood ceiling and concrete floor, and a loft in which are stored pipe, steel, and other not-too-heavy materials.

At the south end of the repair garage is a large Hercules hoist mounted on casters for use in removing engines and transmissions from trucks and tractors, and moving them to suitable locations for repair. The back of the building, for about one-half its length, is occupied by the stock room and office. In the stock room all new parts and tires are stored. The small parts are kept in suitably sized numbered compartments or bins built back to back and 8 feet high. In the first set of bins on one side are U.S.S. bolts and nuts, and on the other side S.A.E. nuts, bolts and rivets. The second set of bins contains miscellaneous parts on both sides as does the third. There are also two sets of wall bins for small parts. A room above this section of the garage is used for the storage of springs, axles, hand shovels, picks, and other small tools in suitable racks. Tires are stored in racks to keep the rubber off the floor, with the tubes on a large shelf on top of the tire racks. Gaskets and tubing are hung on the wall and chain is in suitable bins along the floor.

At the north end of the stock room is the office where all accounting is taken care of and requisitions prepared for new stock as needed. Beyond this is a large locker room with toilet and showers.

At the front of the repair garage is an oil room partitioned off and kept locked. Here grease and oil drums and a kerosene tank are located on the floor, with racks above for the storage of second-hand but still usable tires. All grease and oil are issued to trucks on requisition and charged to the unit.

Toward the northeast corner of the garage is a pit for greasing trucks and other equipment and on the wall adjacent is an Alemite pressure unit of the floor type, with casters, mounted permanently on the wall out of the way with brass tubes leading to the greasing equipment in the pit. The northeast corner of the garage contains the mechanics' work benches while the machine shop is located in the northwest corner in a wire enclosure.

Machine Shop

The machine shop is well equipped for handling practically all major repairs, as well as minor adjustments, to all of the equipment operating out of the garage. The machines include a Sebastian Viking lathe; two riveters for brake linings; a Black & Decker valve resurfacer; a pin grinder; an Ingersoll-Rand garage compressor for providing air for tires and greasing; a Stanley bench buffer and grinder; two Black & Decker ¾-inch and one U. S. Electric ¼-inch electric drills; a Manley gear press; two power-driven grinding wheels, a Buffalo Forge Co. heavy-duty drill press, and several minor pieces of equipment to increase the facility with which machine-shop and repair work can be handled.

The repair garage is heated by a double hot-air furnace with a blower to circulate the air through a long flue with separate outlets along the entire length of the garage.

District 5 Equipment

All equipment for the Kentucky Department of Highways is purchased by advertised bids on open specifications and the contracts awarded to the lowest bidders. This results in a wide variety of equipment but endeavor is made to

(*Concluded on next page*)

Equipment Owned by District 5, Kentucky

(*Continued from preceding page*)

standardize on some equipment so as to reduce the very large investment for necessary repair parts which must be available immediately at the garages so that equipment will not be tied up when needed for maintenance and construction operations. The equipment in District 5 is inter-changeable between the Carrollton and Falmouth Garages, and the following list includes equipment located at both garages:

MOTOR TRUCKS

1 International 1½-ton truck with Cleaver 2-car booster heater
1 Mack 3½-ton truck with 1,000-gallon water tank
1 Chevrolet 1½-ton truck with bituminous pump
1 Chevrolet 1½-ton truck with Ingersoll-Rand compressor
1 Mack 3-ton truck with Etnyre distributor
1 Mack 3-ton truck with shop-made distributor
5 Mack 3-ton dump trucks
1 Federal 7½-ton truck with an Austin distributor
3 Ford ½-ton pick-up trucks
1 Studebaker 3-ton truck with 1,000-gallon water tank
7 Ford 1½-ton dump trucks
13 GMC 3-ton dump trucks
2 Federal 7½-ton dump trucks
6 International 1½-ton dump trucks
13 Chevrolet ½-ton pick-up trucks
12 GMC 1½-ton dump trucks
4 Chevrolet 1½-ton dump trucks
1 GMC 5-7-ton truck with 1,300-gallon Etnyre distributor
2 International 4-ton dump trucks
1 Biederman 4-ton dump truck
2 Dodge 1½-ton dump trucks
2 Plymouth ½-ton pick-up trucks
2 Dodge ¾-ton trucks
2 Dodge ½-ton pick-up trucks
4 GMC ½-ton pick-up trucks
10 International 2-ton dump trucks

TRACTORS

2 Caterpillar 5-ton tractors
1 International tractor
1 Caterpillar Thirty tractor
1 Monarch 35 tractor
1 Monarch 75 tractor
1 Allis-Chalmers Model L tractor
1 Monarch 50 with bulldozer
1 Cletrac 40 diesel tractor
1 J. I. Case tractor

POWER GRADERS

2 International power graders with Rome blades
2 International tractors with Adams blades
1 Caterpillar diesel No. 10 Auto Patrol
1 Caterpillar gas No. 10 Auto Patrol

PULLED GRADERS

1 Adams 10-foot leaning-wheel grader
1 Austin 10-foot grader
1 Adams 8-foot grader
2 Gallon 8-foot graders
2 Rome 12-foot graders
1 Rome 10-foot grader
2 Gallon 10-foot graders
1 Warco 10-foot grader

COMPRESSORS

1 Ingersoll-Rand portable compressor
1 Sullivan portable compressor

CONVEYORS or LOADERS

1 Northern belt conveyor
3 Barber-Greene belt conveyors
1 Fairfield belt conveyor

CRUSHERS

1 Climax jaw crusher
1 American jaw crusher
3 Cedar Rapids jaw crushers
1 Eagle jaw crusher

SKIN PATCH DISTRIBUTORS

(These are trailers towed by trucks and are equipped with power pumps driven by Wisconsin motors.)
1 Hvass 800-gallon unit
1 Hvass 600-gallon unit
1 Shop-made 600-gallon unit
2 Littleford 600-gallon units

ASPHALT KETTLES

1 Littleford 350-gallon kettle
1 Littleford 300-gallon kettle
2 Chausse 300-gallon kettles
4 Littleford 100-gallon kettles

BITUMINOUS MIXERS

1 Rex tilting mixer
1 Jaeger tilting mixer

CONCRETE MIXERS

2 Rex 5-S mixers
1 Rex 55 mixer
1 Jaeger 4-L mixer
1 Rex No. 5 mixer
1 Leach mixer
2 Leach 7-S mixers
1 Lansing 10-S mixer
1 Rex 7-S mixer

PORTABLE PUMPS

1 Hill
1 Atlas
1 Gould centrifugal
2 Roper
1 Worthington centrifugal
2 Domestic
1 Viking

ROAD ROLLERS

2 Hercules 10-ton 3-wheel rollers
1 Galion 3½-ton 3-wheel roller
1 Littleford Wheeled Roller

POWER SHOVELS

2 Lorain 55 1-yard shovels
1 Universal-Lorain 30 ½-yard shovel

EQUIPMENT TRAILERS

1 LaCrosse equipment trailer
1 Electric Wheel Co. equipment trailer

POWER UNITS

1 Holt-Stark engine
1 Delco engine
2 Climax engines
1 Buda engine

AIR DRILLS

1 Thor
1 Ingersoll-Rand

PNEUMATIC ROCK DRILLS

2 Ingersoll-Rand
2 Thor

POLE TRAILERS

12 2-wheel trailers
3 4-wheel trailers

SNOW PLOWS

1 Baker snow plow
1 Heil snow plow
9 shop-made plows for pulling behind trucks

MISCELLANEOUS EQUIPMENT

1 Pile driver
1 Cleaver trailer-mounted booster heater
1 Littleford Traf-O-Spray line marker
2 Centaur Hiway mowers
1 Koehring Mud Jack
2 Pangborn AV sand-blast machines for cleaning steel bridges
1 Hough power sweeper
2 Baker scrapers
1 Barber-Greene stone drier
1 Ingersoll-Rand air hammer for sheeting
2 Avery disc harrows
1 Gledhill maintainer
4 10,000-gallon bituminous storage tanks
3 Wizard pull-type plows
1 Black & Decker electric saw
1 Baker scarifier
2 Rotary sweepers for pulling behind trucks
1 1,000-gallon bituminous tank, truck-mounted
1 Knickerbocker power rip saw
1 Butler sand spreader
1 Sterling 4-inch centrifugal pump

Personnel

The Kentucky Department of Highways is under the direction of J. Lyter Donaldson, Commissioner of Highways, and T. H. Cutler, State Highway Engineer. M. D. Ross is in charge of work in District 5, with W. D. Willoughby, Garage Foreman at District Garage 5A, Carrollton, Ky.

New Bulldozers

The development of a new line of cable-controlled bulldozers and trailbuilders has recently been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. The name of Unitilt has been given these new models because of their patented tilting device and the universality of their frame which permits using either bulldozer or trailbuilder moldboards on the same frame. This latter feature eliminates the expense of two frames in order to have both bulldozer and trailbuilder and greatly simplifies a changeover, as one man can easily change the moldboards which can be dismounted from the tractor by pulling two king pins. The sidearms and other parts stay in place.

The tilting device is located on one side arm and permits raising or lowering either the bulldozer or trailbuilder blade at either end a distance of 12 inches. Turning only one bolt is all that is required to effect the tilting adjustment.

Other features claimed for the new design include the construction of the front cross beam so that the blades hug the radiator, thus reducing the heavy overhanging load on the front of the tractor as well as reducing wear on front idlers and track rolls; the blade curvature which rolls the dirt ahead, reducing dead weight and permitting bigger loads in front of the blade; a 60-inch lift of the blade and unlimited depth of cut below ground level; a natural digging action of the blade which cuts as deep as desired without requiring any mechanical means of creating down pressure; balanced design to prevent tipping of the tractor and keep the full length of crawlers on the ground; the side arms mounted at the drive axle of the tractor; and rigid fully braced members to withstand all types of bulldozing work.

Literature and specifications on these Unitilt bulldozers and trailbuilders may be secured from the manufacturer by referring to this item.

Non-Clog Sump Pumps For Wet Underpasses

A new intermittent-duty sump or bilge pump designed for municipal and highway installations, including the disposal of surface or storm water at underpasses or from deep basements, has been announced by Fairbanks, Morse & Co., 600 S. Michigan Avenue, Chicago, Ill. These new pumps are available in 2, 3, 4 and 5-inch sizes for capacities up to 1,400 gpm and for heads up to 120 feet with settings up to 25 feet. The pumps in the larger discharge sizes handle solids up to 3 inches in diameter.

The installation of these F-M 5410SS pumps requires no dry, water-tight pump pit as the pump is suspended from the floor level into a sump. Multiple pump units may be suspended in one sump where large variation in flow requires reserve pumping capacity.

An attractive 14-page Bulletin APB 240.10 describes this complete line of sump pumps and may be secured direct from Fairbanks, Morse & Co. by mentioning this item.

Pressure Vibration Of Concrete Tested

Cuyahoga County, Ohio, Experimented with New Method of Finishing on County Concrete Paving

By JOHN O. McWILLIAMS, Cuyahoga County, Ohio, Engineer

✦ FOR the past year Cuyahoga County, Ohio, has been experimenting in Greater Cleveland with a new method of constructing concrete pavements, aimed to give greater strength and durability. While these investigations have not progressed to the point where absolute conclusions are possible, the tests and observations made to date indicate that the new method will result in much better concrete roads in the future and that it can be applied successfully in the field at a cost not exceeding that of ordinary placement, and perhaps at a saving.

The new process or method, known as pressure-vibrated concrete, utilizes for the first time on new pavements the principle of horizontal vibration or the transmission of impulses to the concrete in a plane parallel with the road surface while the concrete is being compressed, and also combines the vibration with the placement and finishing of the concrete.

The experiments were made with a newly designed machine in cooperation with William P. Day of the International Vibration Co. and followed its successful use in Cuyahoga County in patching old pavements and in resurfacing spalled concrete with very thin skin patches. During the course of the experiments Mr. Day has made a number of changes to improve the machine.

The new process utilizes a concrete of between ½ and 1-inch slump. In combining vibration with placing and finishing, the machine eliminates slow hand spreading, consolidates the low-slump concrete, makes but very little hand finishing necessary, and permits almost immediate covering for curing. The difficulty experienced with these factors in ordinary work, especially when attempts to use a very dry concrete are made, have been recognized as responsible to a great extent for much lack of uniformity and early surface disintegration. Pressure-vibrated concrete on these experiments has shown no tendency toward the formation of laitance and from ½ to ¾ gallon less water is required per bag of cement. Over-vibration is practically eliminated.

Difficulties Experienced

At this time, with the machine in its present state of development, it seems that two-course vibration is necessary for maximum benefits. On the first sections to be laid, one pass of the pressure vibrator was made at the finish level. The result was a sounder surface than obtained on adjacent non-vibrated sections. However, in spite of the reduction in water of the vibrated sections, the cores from them revealed no increase in strength in compression tests over the cores from the regularly placed sections. Apparently the limit of efficiency of the process was exceeded in attempting to place a 7-inch thick layer of ¾-inch average slump concrete and the forces transmitted to the mix were insufficient to cause proper flow of grout around the aggregate particles.

In laying several other sections, two passes of the pressure vibrator were made. The first pass vibrated and cut off the concrete 2 inches below the finished surface, providing a level surface for the reinforcing mesh. The second pass vibrated the final 2 inches to the proper grade and contour. This procedure resulted in an average gain in strength of 23 per cent for vibrated concrete over non-vibrated in compression tests made on cores cut from the pavement. Pressure-vibrated cores developed an average compressive strength of 5,562 pounds per square inch at 28 days as compared with 4,503 for non-vibrated. The mix was the same in both cases.

Unfortunately, we have not as yet been able to set up a special section specifically for experimental purposes and difficulty has been experienced in maintaining uniform batches. The results, consequently, have been erratic. Nevertheless, freeze and thaw tests have shown on the whole a definite trend in the direction of greater surface durability despite the fact that individual specimens varied greatly. On the average, pressure-vibrated specimens offered more resistance, losing 23.73 per cent in weight while non-vibrated specimens scaled considerably and disintegrated to a loss in weight of 48.07 per cent over the same number of cycles.

Spreading, finishing and vibrating the 2-inch top course on a Cuyahoga County, Ohio, concrete highway.

Machine Used

The machine used in the new method is of the external vibratory type and moulds the concrete by means of a pressure vibration screed extending across the full width of the road panel. It is mounted between two end trucks traveling on steel or other suitable road forms and has a power drive. The end trucks are equipped with vibration dampeners to minimize form vibration.

The forward or receiving plane of the screed is slightly higher than the back plane and consequently of greater capacity. This, in effect, forms a compression chamber which moulds the surface to the level of the road form as the screed passes over the concrete. A series of fins, set parallel to the direction of travel and projecting into the concrete vertically, aid in transmitting vibratory impulses and in moulding the surface.

(*Concluded on page 54*)

Change of Address

(Mail to Contractors and Engineers Monthly, 470 4th Ave., New York, *today*)

From_____
(*Old address*)

_____

_____

To_____
(*New Address*)

_____

_____

Name_____

Odie Monahan Photo
When properly maintained, cranes and derricks serve the construction industry faithfully year after year.

Wire Rope Important To Crane Efficiency

(*Continued from page* 20)

weight, extensive repairs were required to the base and foundation of the bridge leg, and the crane was out of service for three weeks. This would have brought about an emergency situation but for the use of crawler-type cranes which were brought to the particular location to fill in the gap.

The longer a rope can be used, naturally the more economical it becomes. Users of ropes have adopted many practices whereby only the most damaged section of a rope is cut off, and the remainder of the rope is continued either in the same service or elsewhere. It is sometimes possible to cut a damaged section in the middle of a length of rope and use each of the remaining ends.

It often happens that a rope is damaged in the process of installing it. Such a rope has its life unduly shortened. Moreover, a kink may render the rope unsafe for any further use. Many a rope has been scrapped because it "shorted" on the bridge conductors of an overhead crane, through failure to provide proper protection to the bridge conductors.

This subject of rope maintenance is very important from the standpoint of keeping cranes in service, because in many cases cranes are shut down because of rope conditions more frequently than for any other reason.

Sheaves and Drums

Where drums and sheaves can be increased in size, such an alteration will materially improve rope economy. Increase of 50 per cent in sheave and drum diameters has been known to double the life of rope.

Sheave and drum grooves should be gaged frequently for size. This is especially important just before a new rope is installed. A badly worn groove will often pinch a new rope and greatly shorten its life. When a sheave or drum needs to be regrooved, this operation should not be put off any longer than necessary. To save time, it may be desirable to keep a spare sheave on hand and install it in place of the worn sheave.

One user of bucket cranes reports that he has increased the life of the cast iron sheaves at the boom end from one year to five years by having the sheave groove coated with high-carbon steel by the metal spraying process. Each sheave is given only one such application and is finally discarded when the sides of the groove are worn thin.

Sheave bearings should be watched carefully and replaced before failure occurs. A bad bearing may cause the sheave to stick, and the rope grinds the sheave tread out of round, which is also disastrous to the rope. Bearing trouble may throw the sheave out of true, causing undue wear of the rope against the sides of the sheave groove. Such a condition should not be tolerated but should be corrected without delay.

Other Crane Equipment

Leaving the subject of rope, we come to the maintenance of such equipment as wheels, brakes, and clutches. The flanges of bridge and trolley wheels should be regularly inspected for cracks, chipped edges, and other flaws. This is especially important where the wheels are castings.

Brakes on all drives, as well as load brakes, need periodic inspection and testing. Clutches are another part of the equipment that should be periodically inspected. Regular inspection of such equipment over a long period of time without revealing any trouble often leads to an indifference toward further inspections. A laxness in such matters is apt to end with an accident that could have been averted had the original inspection program been followed.

Lubrication

Lubrication of bearings and wearing parts should not be neglected. Sleeve bearings will require much more frequent lubrication than roller bearings. Oil tanks for gear drives and for load brakes should be kept filled to their proper height with the correct grade of lubricant. Wire ropes require lubrication to replace that which is lost in service, and particular care should be given to rope lubrication where the rope is subjected to rain, wind, or dust. The lubricant should have sufficient body to fill the voids between the wires, and to get penetration through the wires and into the hemp center, the lubricant may be applied hot.

Stick to the Schedule

The best inspection and maintenance schedule in the world is not much good if it is not carried out as intended. Every operator, as well as every electrician and mechanic, must have a feeling of personal responsibility in the matter of maintenance and safety, so he will allow nothing to interfere with the schedule that is set up.

An idle crane earns nothing on the huge capital investment that it represents. It is doubly unfortunate if, when there is work for the crane to do, it is out of service for repairs. A sensible maintenance and inspection program, conscientiously carried out, should be combined with practices that will reduce the maintenance load. This gives the surest guarantee that the crane will always be ready for work.

The main title of an interesting one-reel motion picture sponsored by the New Hampshire and Vermont State Highway Departments.

Selling Good Roads Through the Movies

An interesting project, portraying through the medium of motion pictures the timely message of the good roads of New England and emphasizing the importance of their modern bridge structures, has just been sponsored by the State Highway Departments of New Hampshire and Vermont. Telling the story of their modern highways by means of an autumn tour through those states, this film differs from the usual travelogue in its emphasis on the engineering responsible for the highways leading to New England's points of interest. In addition, it opens up a new means of telling the public about its own roads, how they are built, and the necessity of spending highway funds solely for the construction and maintenance of their roads. From this point of view, the project should be of particular interest to state highway departments and good roads associations.

The foreword title states: "From the broad Atlantic on the East to the majestic Lake Champlain on the West, this picturesque mountain and lake region of New England is traversed by a network of modern highways which mark the growth and development of the land, its people, and its industries—highways that bespeak the progress of transportation and open new worlds of travel and adventure for the tourist of today." This is followed by a brief historical opening depicting road transportation of New England from the early days of the ox-cart, the turnpike coach and the horseless carriage at the turn of the century to the motor cavalcade of 1941.

Illustrative of its unusual touch is a scene showing an old covered bridge, which fades into a blue print of a modern structure and then into the structure itself, accompanied by this commentary: "The stone bridge and covered bridge of yesteryear are fast disappearing from the New England scene to be replaced by modern bridge structures, scientifically designed, planned and constructed to meet the increasingly heavy traffic problem and give maximum protection to the motorist; structures which eliminate hazardous crossings and separate opposing and intersecting traffic streams. An excellent example of modern bridge engineering is the recently constructed Maine-New Hampshire Interstate Bridge between Portsmouth, N. H. and Kittery, Maine."

This one-reel Cinecolor film was produced by the Emerson Yorke Studio, 130 W. 46th St., New York City, under the sponsorship of the State Highway Departments of New Hampshire and Vermont. It was written and directed by Emerson Yorke, narrated by Alois Havrilla, and Frederick A. Gardner, Assistant Engineer of the New Hampshire State Highway Department, was Technical Advisor.

Highway Officials Convene

The Western Association of State Highway Officials will hold its annual convention on June 17-20 at Casper, Wyo. Frank Kelso, Superintendent of the Wyoming State Highway Department, reports that plans are rapidly taking shape for the meeting, which will celebrate the twentieth anniversary of the association, and that it will be one of the most instructive ever held by the organization.

Some of the problems to be studied are highway safety, national defense roads, motor vehicle taxation, and compaction of highway embankments.

New Crawler Tractors

A new 55-hp diesel tractor, designed to meet the present-day problem of greater capacity and speed without increased operating costs, has been announced by the Caterpillar Tractor Co., Peoria, Ill. In addition to a number of mechanical improvements, the efficiency of this machine has been increased by considering the operator's comfort and lessening fatigue, according to the manufacturer.

The tractor has been geared to the job with nine working speeds, five of them forward, offering a range from 1.4 to 5.8 miles an hour. For each of the first four forward speeds there is a corresponding but slightly higher reverse; and the motion of the tractor can be reversed merely by pushing or pulling a single lever. An optional transmission group, giving speeds spaced from 1.7 to 5.3 miles an hour, is available.

For greater strength without increase in weight, welded steel construction is used extensively. The frame and steering clutch case are of this construction, and built into a one-piece unit. Accessibility has been a prime consideration in the design; for example, steering clutches are individually removable through the top of the steering clutch case, without disturbing the final drive or the large bevel gear that drives the clutches.

Power is furnished by a 6-cylinder water-cooled Caterpillar diesel engine, with a bore and stroke of 4¼ x 5½ inches at a full load governed rpm of 1,400. The engine is completely sealed against dust and dirt, and has only two working adjustments: the fan belt and valve clearance. Fuel and lubricating oil are filtered through special absorbent-type cotton filter elements.

Cylinder liners and crankshaft journals, as well as many other parts of the tractor, including track roller shafts and rims, are given a Hi-Electro induction hardening treatment. The crankshaft journals are then Superfinished to within a few millionths of an inch of absolute accuracy, the manufacturer states.

A spark-ignition tractor, the R6, of the same horsepower has also been announced by Caterpillar. This machine, which is similar in engineering design to the new D6, is powered by a 6-cylinder gasoline engine of the same bore and stroke.

Graders, Snow Plows And Power Control Units

J. D. Adams Co., 217 Belmont Ave., Indianapolis, Ind., has recently issued four new pieces of literature describing its equipment. Form 411 is devoted to the Adams motor grader No. 412, equipped with a 68½-hp diesel engine, and contains specifications and information on its design, construction and operation. Form 415 contains the same information on the Adams motor grader No. 201 which is powered with a 31-hp gasoline engine. Form 413 describes and illustrates Adams snow plows and snow wings for use with Adams motor graders, and Form 414 is on the Adams power control unit for use on any crawler tractor.

Copies of the catalog describing the piece of equipment in which you are particularly interested may be obtained direct from the manufacturer by mentioning this magazine.

Huge Tent Over Site Of Mud Mountain Dam

(*Continued from page 29*)

for miscellaneous grading work, and a Caterpillar motor grader is in service maintaining the work roads. A Bucyrus-Erie 54-B diesel was used on spillway excavation, loading both railroad cars and dump trucks, but has since been shipped to the Denison Dam project in Texas, for which the Guy F. Atkinson Co. is also the contractor. In addition, there is a Pacific 30-ton derrick with a 150-foot boom for general service; a fleet of Ford and International service and pick-up trucks; two portable welders; and an International grease truck equipped with a diesel-driven compressor and an Alemite pressure lubricating outfit.

Huge Tent Over All

Recently a large tent was erected over the core area to prevent stoppage of work by rains or snow. The area will be so protected until the dam has been raised at least 200 feet above bed rock. The giant canvas, weighing 35,000 pounds, was made by the Seattle Tent & Awning Co. It is designed to shed the heaviest rain storms as well as to withstand wind and snow loads. Water draining off the eaves is carried away by a combined access catwalk and drainage trough attached to the canyon walls.

The canvas was laid in sections on the floor of the canyon, laced, and lifted in one piece by 22 Beebe hand hoists. Eight of these hoists were 15-ton special triple-geared units which control and hold the ridge of the tent, while the remainder are 5-ton special 24-inch wide drum units, mounted along the canyon wall on either side to control the eaves of the tent and maintain proper tension at all times. The tent is suspended by six main steel cables across the canyon and fastened to concrete anchors in the canyon walls at Elev. 1,120. The eaves of the tent are held in place by fourteen ½-inch steel ropes attached to the 5-ton Beebe hoists and threaded through single blocks fastened to the tent and a series of special double blocks on a 1-inch steel rope attached to the canyon walls by eye bolts.

Personnel

The construction of Mud Mountain Dam is under the direct supervision of the Seattle District of the U.S. Engineer Department, Col. B. C. Dunn, District Engineer, and Major Peter P. Goerz, executive assistant in charge.

Guy F. Atkinson Co., of San Francisco, is the contractor for the work, the original contract amounting to $5,345,000. Guy F. Atkinson is President of the firm and George H. Atkinson, Vice President. Ray H. Northcutt is Resident Manager; D. E. Root, General Superintendent and Chief Engineer; and G. W. Wintz, Assistant Manager.

More Turnpikes?

The creation of Turnpike Authorities to construct toll roads has been proposed in a number of states, following the example of Pennsylvania, according to the National Highway Users Conference. Bills in Maine, Cook County, Illinois, Missouri, New Jersey, Oklahoma and Wisconsin (applicable to Milwaukee only) would set up independent corporations with power of eminent domain, to finance the construction of turnpikes through the issuance of bonds and to amortize the cost from toll collections. Bills in Pennsylvania would extend the present Turnpike westward to the Ohio state line and authorize a Rim Parkway in the Pocono Mountains.

The Maryland Legislature has empowered the State Roads Commission to construct toll motorways from Washington to Baltimore and from Bel Air to the Pennsylvania state line. A measure creating a Westchester, N. Y., Cross County Parkway Commission with Turnpike powers has been sent to the Governor, and the Governor of Ohio may recommend a Turnpike Authority to construct a $100,000,000 super-highway through northern Ohio.

New Lubricant Pumps Announced by Alemite

New lubrication-barrel pumps especially designed for heavy-duty usage by contractors and in state and county garages and maintenance depots have been announced by the Alemite Division, Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill.

One type, a volume barrel pump for 400-pound oil drums which is available in three models, operates with a 40-to-1 piston delivering up to 6 pounds of regular semi-solid lubricant a minute. When equipped with a 7-to-1 piston this pump can deliver up to 15 pounds of lubricant a minute. For medium and smaller setups, where the requirements are less severe, Alemite Standard and Master grease pumps are designed for use directly on lubricant drums. In both high and low-pressure models, these two pumps are equipped to fit both 100 and 400-pound oil drums.

Another type is the new Alemite air-operated motor oil pump, a heavy-duty volume pump fully capable of delivering 5 gallons of S.A.E. 10 oil or 3 gallons of S.A.E. 60 oil a minute. This pump is adjusted to fit directly on the original 55-gallon oil drum and is equipped with Alemite's new and improved Aldura air valve.

All of the Alemite heavy-duty volume pumps are equipped with an additional feature, the Dynamatic Primer, which is said to enable the pumps to handle heavy fibrous lubricants with ease. All pump castings are of fine grain cast iron of high tensile strength, and the wearing surface of the cylinder is hard chrome-plated over the cast iron.

It is reported that these new barrel pumps were subjected to a grueling test to prove that they will operate as well in winter temperatures as in warm weather. A stock 1941 high-pressure Alemite pump and a 100-pound drum of extra heavy fibrous lubricant were placed in a tank of water and then pump, drum and tank placed in a refrigeration plant for several days, the water freezing into a 1,000-pound block of ice completely encasing the pump and drum of lubricant. It is stated that the pump not only operated under these severe conditions, but actually delivered lubricant fast enough and in amounts sufficient to lubricate automobiles, at 6,000-pounds pressure per square inch.

Further information on this new line of Alemite lubricant pumps may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

County Experiments In Concrete Vibration

(*Continued from page* 50)

The vibration unit is centrally located in the screed base where it is mounted in a horizontal position. It produces a minimum of 4,800 impulses per minute at a centrifugal force of approximately 5,200 pounds.

As the concrete is discharged from the mixer in front of the machine, a revolving screw carries or spreads it out over the width of the road panel. The thread of the screw runs in opposite directions from the center of the machine out towards the road forms.

Having been spread, the concrete then passes through a series of vibrating and revolving cutters or discs which are mounted at a 30-degree angle. These puddle the concrete for feeding into the screed compression chamber and eliminate segregation of materials. To the rear of the screed it passes a crown former which can be adjusted to any desired contour.

On all test sections standard methods of preparing the subgrade were followed with some slag used as a drain cushion. Standard welded mesh reinforcing and cork expansion joints with dowel bars on 1-foot centers were used. Very little floating was permitted. After being straight-edged, the pavement was rough-broomed and covered with wet burlap and then with wet straw after 24 hours.

Conclusions

On the basis of the results obtained to date we are satisfied with pressure-vibrated concrete but in future experiments hope to be able to control test conditions more accurately. To make this method fully effective requires strict control of the mix within the range of slump specifications, avoidance of over-manipulation of the surface by floating, and immediate covering.

Bank Sloping Machine

The Cornett Sloper for bank sloping cuts shale, broken rock, clay and all kinds of soil, and can be attached to any shovel in less than an hour without making any changes. According to the manufacturer, Cornett Sloper, 607 DeGraw St., Brooklyn, N.Y., you simply release the hoist line from the bucket and attach it to the sloper bucket. Then attach the bottom of the sloper to the bucket tooth. Line drawings reproduced in a catalog describing the sloper show very clearly how this is done.

Copies of this catalog may be obtained by those interested by writing direct to the manufacturer and mentioning this item.

C. & E. M. Photo

A borrow pit transformed into an attractive roadside.

Roadside Borrow Pit Loamed and Seeded

When D. O'Connell's Sons, of Holyoke, Mass., built a section of the new cut-off on Massachusetts 63 in Montague and Sunderland, there were numerous cuts and fills to provide a smooth grade. On the section shown in the illustration there was a deep cut, the west slope of which was required to be covered with 6 inches of loam and seeded.

The contractor proposed to open a borrow pit on private property with an entrance through this slope. By agreement between the contractor and the Department of Public Works a roadside pit was substituted with an opening for the full length of the cut. The agreement required that the contractor would slope and grade the entire area, using the same loam and seed treatment proposed for the road slopes. The contractor agreed to do this on all areas beyond those shown in the original plans at his own expense. This was done, producing the attractive slope shown at no additional cost to the state, and credit is due the contractor for the pleasing results obtained.

J. V. McManmon, Director, Roadside Development, Massachusetts Department of Public Works, writes, "It is with this type of cooperation at the time of construction that many fundamental features of roadside development can be carried out if the cooperation of the contractor and engineer is there. It makes it more economical and is appreciated by the public as well as by the Department".

Sectional Trough Conveyors Described in New Catalogs

Profitable uses of the Model 347 sectional trough conveyor, made by the Portable Machinery Div., A. B. Farquhar Co., Ltd., York, Penna., are limited only by the imagination of the man on the job, according to the manufacturer. The conveyor is so designed that it can be mounted, up to 75-foot lengths, on the elevating wheel truck, it can be mounted on wheels or casters for horizontal conveying where portable units are required, or it can be installed in any desired length on stationary supports. Length can readily be increased or decreased as required. It can easily be transported from job to job and reassembled in whatever form is most suitable for the changed requirements.

This Model 347, and the Model 348 for permanent and semi-permanent installations, are described in literature recently issued by this company. Copies may be obtained by writing direct to the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Lincoln Sales Engr.

The Lincoln Electric Co., Cleveland, Ohio, announced recently the appointment of Stewart J. Hieronymus as Sales Engineer at its San Francisco office. Prior to this appointment, Mr. Hieronymus was associated with Cutler Hammer, Inc., for 12 years.

Alternate Methods of Concrete Curing Permitted by State Highway Departments

STATE	Cotton Mats: Osnaburg Covered	Cotton Mats: Burlap Covered	Burlap: Single or Double	Waterproof Paper: On Fresh Concrete	Waterproof Paper: After Wet Burlap	Bituminous Material: On Fresh Concrete	Bituminous Material: After Wet Burlap	Calcium Chloride	Colorless Compounds: On Fresh Concrete	Colorless Compounds: After Wet Burlap	Silicate of Soda After Wet Burlap	Hay or Straw After Wet Burlap	Ponding After Wet Burlap	Wet Earth After Wet Burlap
Alabama	x	x	-----	x	-----	-----	-----	-----	-----	-----	-----	-----	x	x
Arizona	x	x	x	x	x	x	-----	-----	-----	-----	-----	-----	x	-----
Arkansas	x	x	-----	-----	x	x	x	x	x	x	-----	x	x	x
California	-----	-----	-----	-----	x*	-----	-----	-----	-----	x*	-----	-----	x	x
Colorado	-----	-----	x	-----	-----	-----	-----	-----	x	x	-----	x	x	x
Connecticut	x	x	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Delaware	x	x	x	-----	-----	-----	-----	x	-----	-----	-----	x	-----	x
Florida	x	x	x	-----	x	-----	-----	-----	-----	-----	-----	-----	-----	x
Georgia	x	-----	-----	x	-----	-----	-----	-----	-----	-----	-----	-----	x	x
Idaho	x	x	-----	-----	-----	-----	-----	x	x	-----	-----	-----	x	x
Illinois	x	x	x	-----	x	-----	-----	x	-----	-----	-----	x	-----	-----
Indiana	-----	-----	x	x	-----	-----	-----	-----	-----	-----	-----	x	-----	-----
Iowa	x	x	x	-----	x	-----	x	x	x	-----	-----	x	x	x
Kansas	x	x	-----	-----	-----	-----	-----	-----	-----	-----	-----	x	x	x
Kentucky	-----	-----	x	-----	x	-----	-----	-----	-----	-----	-----	x	x	x
Louisiana	x	x	-----	-----	x	-----	-----	-----	-----	-----	-----	-----	x	x
Maine	-----	-----	-----	-----	x	-----	-----	-----	-----	-----	-----	x	-----	x
Maryland	x	-----	x	x	-----	x	-----	x	x	-----	-----	-----	-----	x
Massachusetts	x*	x*	x	-----	x*	-----	-----	-----	-----	-----	-----	x	-----	x
Michigan	x	x	x	-----	-----	-----	-----	-----	-----	-----	-----	x	-----	x
Minnesota	x	x	x	x	-----	-----	x	x	-----	-----	-----	-----	-----	-----
Mississippi	x	-----	-----	x	-----	-----	-----	-----	-----	-----	-----	-----	-----	x
Missouri	x	-----	x	-----	x	-----	-----	x	x	x	x	x	x	x
Montana	o	o	o	o	o	o	o	o	o	o	o	o	o	o
Nebraska	-----	-----	x*	x*	x*	x*	x*	-----	x*	x*	-----	x	x	x
Nevada	x	x	-----	x	-----	-----	-----	-----	-----	-----	-----	x	x	x
New Hampshire	x	x	x	x	x	-----	-----	-----	-----	-----	-----	x	-----	-----
New Jersey	x	x	-----	x	-----	x	-----	-----	-----	-----	-----	x	-----	-----
New Mexico	†	†	†	†	†	†	†	†	†	†	†	†	†	†
New York	x	x	-----	x	x	x	x	-----	x	-----	-----	x	-----	-----
North Carolina	x	x	x	-----	x	-----	-----	-----	-----	-----	-----	-----	x	x
North Dakota	x	x	x	x	x	x	x	x	-----	-----	x	x	x	x
Ohio	-----	x	-----	-----	x	-----	-----	x*	-----	-----	x*	x	x	x
Oklahoma	x	-----	-----	x	x	-----	-----	x*	x	-----	x*	-----	-----	x
Oregon	x	x	-----	-----	-----	-----	-----	-----	-----	-----	-----	§	-----	x
Pennsylvania	-----	x	-----	-----	x	-----	x	x	-----	-----	-----	x	-----	-----
Rhode Island	x	x	x	x	x	-----	-----	x	-----	-----	-----	-----	-----	-----
South Carolina	x	x	-----	x	-----	-----	-----	-----	-----	-----	-----	x	x	x
South Dakota	-----	-----	x	-----	x	-----	-----	-----	-----	-----	-----	-----	x	x
Tennessee	x	x	x	-----	x	-----	-----	x	-----	-----	x	x	x	x
Texas	x	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	x
Utah	-----	-----	-----	x	-----	x*	-----	-----	-----	-----	-----	-----	x	x
Vermont	x	x	x	-----	-----	x*	-----	-----	-----	-----	-----	x	-----	-----
Virginia	-----	x	x	x	x	-----	-----	x	-----	-----	-----	-----	x	x
Washington	x	x	-----	x	-----	x	-----	-----	x	-----	-----	-----	x	x
West Virginia	-----	-----	x	-----	-----	-----	-----	x	-----	-----	x	-----	-----	-----
Wisconsin	x	x	x	x	-----	-----	x	x	-----	x	x	x	x	x
Wyoming	-----	-----	x	-----	-----	-----	-----	-----	x	-----	-----	-----	-----	-----

NOTE: (x) Curing Agent included among Alternate Specifications. (*) By consent or only if shown in special specifications and plans. (o) No return on questionnaire sent to Montana. (†) Does not construct concrete pavement. (§) Oregon permits the use of wet sawdust but not hay or straw.

Methods of Curing Concrete Pavements

The latest information on state highway department specifications for curing concrete paving in 47 states has been compiled by John G. Gasteiger, Highway Materials Department, National Automotive Fibres, Little Falls, N. Y., based on questionnaires sent directly to the state highway departments, and is included in the table above.

A study of this table indicates some interesting data on the various types of curing permitted on state highway work. In 33 states, all-cotton mats of the osnaburg type or wet earth, after an initial cure with wet burlap, is allowed in the state specifications; 30 states permit the use of burlap-covered cotton mats; 25 states allow wet burlap or ponding after an initial application of wet burlap; 24 permit hay or straw after wet burlap while Oregon does not allow the use of hay or straw but does permit the use of wet sawdust; in 21 states waterproof paper may be used after an initial application of burlap; and in 18 states it may be applied to the fresh concrete.

Of the curing compounds, 17 states permit calcium chloride as an admixture or as a surface cure; 11 allow colorless curing compound applied on fresh concrete; 8 states permit bituminous material applied to fresh concrete and 8 only after an initial application of wet burlap. Silicate of soda after wet burlap is permitted in 7 states and the other types of curing are allowed in from 1 to 5 states.

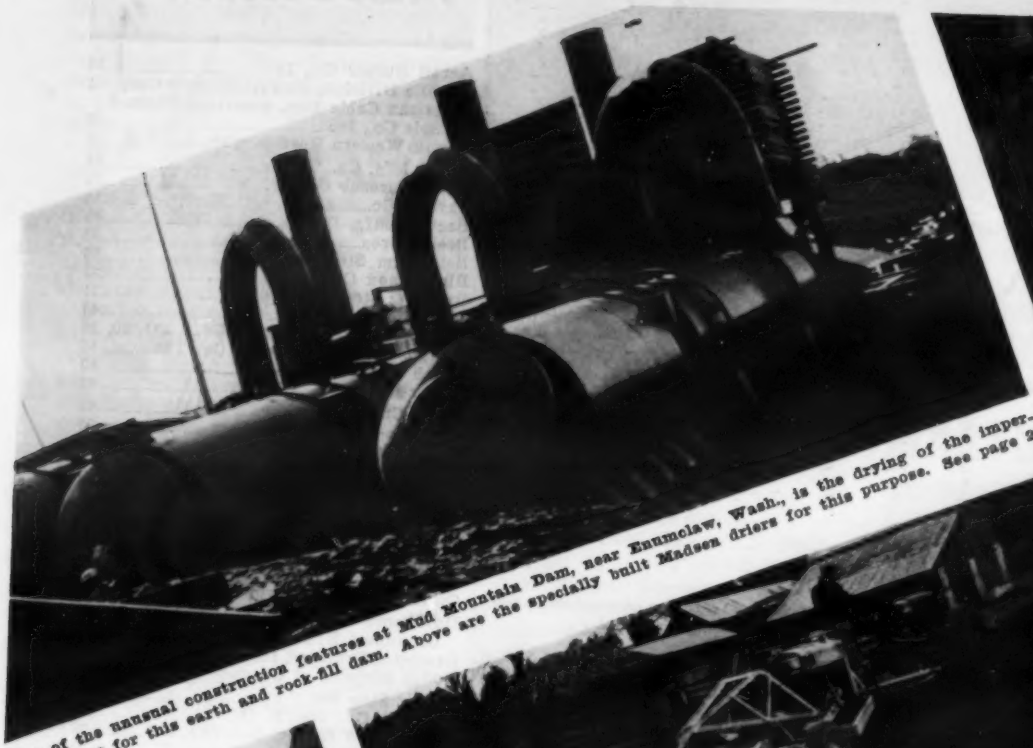
Booklet on Diesel Fuel, Lubricants and Operation

"The Relation of Fuel and Lubricants to Operating Efficiency in the Diesel Engine" is the title of a booklet issued by the Texas Co., 135 East 42nd St., New York City. In the front of the book it states that "although presented in an elementary manner, the material is primarily intended for those who have had diesel experience, since they will profit most by this study". The fundamentals of diesel operation are covered, with diesel engine classification and description, performance, physical properties of lubricating oil, selection of lubricating oil and diesel fuel, etc., and many tables included.

Copies of this 92-page booklet may be obtained without obligation direct from the manufacturer by mentioning this item.

Index to Advertising

Contractors and Engineers Monthly



One of the unusual construction features at Mud Mountain Dam, near Enumclaw, Wash., is the drying of the impervious core for this earth and rock-fill dam. Above are the specially built Madsen driers for this purpose. See page 2.

Scenes at a typical district garage of the Kentucky Department of Highways at Carrollton, Ky. At left, men working at a Buffalo drill press in the machine shop; center, the front of the repair garage, showing the wide doors to permit the entrance of heavy equipment for overhaul; and bottom, a safety hoist mounted on a movable frame permits the removal of heavy engines, like this Cletrac diesel, for complete servicing. See page 25.

C. & E. M. Photos

Because of the working conditions at the Southbury, Conn., Training School, F. H. McGraw & Co., contractor for paving the drives at that institution, moved the mixing unit of his Barber-Greene traveling bituminous plant to a commercial sand and gravel plant 18 miles distant. Top, the pick-up end of the B-G plant set up at the gravel pit; center, mixing and loading the plant-mixed road mix at the pit; bottom, detail of the delivery end of the B-G mixing unit placing the mix in a truck. See page 44.

C. & E. M. Photo

C. & E. M. Photos

Delaware's first soil-cement base stabilization job. Top, the motorized Pulvi-Mixer pulled by a Farmall tractor gave a thorough mixing of soil and cement; circle, a quack-grass cultivator aided in turning the soil during mixing; bottom, a spring-tooth harrow and a spike harrow also aided in the mixing, the latter acting more as a leveler. See Page 1.

C. & E. M. Photos

Detail of the scaffold and reinforcing for one of the six circular pumping stations to remove ground water and sewage from behind the new flood wall and levee at Ironton, Ohio, during the periods of high water. See page 27.